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JOEL HASTINGS METCALF.

By S. I. BAILEY.

Joel Hastings Metcalf was born in Meadville, Pa., on January 4, 1866, and died suddenly in the full vigor of manhood on February 21, 1925. A very unusual man thus closed his earthly career at the age of fifty-nine years. Into this span of life was crowded a wide range of activities. In at least three distinct lines of endeavor he achieved an honorable success.

First of all, he was a preacher, a minister in its best sense of the Unitarian Church. To him God was an imminent reality and man's immortality a fact already begun on this Earth. One of the charming traits of his character consisted in a wide tolerance side by side with an intense faith. In the presence of every shade of belief or unbelief, one felt the fervor of his own undisturbed faith. He had strong self-confidence without self-assertion. The doubts of others seemed not to disturb him at all. He was charitable, sympathetic, gracious, but also cool, strong, persistent. Above all, he had an abounding enthusiasm. He met each man on his own plane and took him at his best. Early in life he formed a clear plan of action, and he had the will, energy, and ability to carry it out. This involved continued study and adventure in different lines, and is well illustrated in his educational development. He graduated from the Meadville Theological School in 1890. Immediately he took up advanced studies at the Harvard Divinity School. In 1892 he obtained the degree of Ph. D. from Allegheny College. Later, after more than ten years of labor in the ministry, chiefly at Burlington, Vermont, he studied for a year at Oxford University. While there, in addition to attending some twenty-five lectures weekly on philosophy and religion, he was given a key to the astronomical observatory by Professor Turner and gave much time to astronomical problems. He had been in danger of a nervous breakdown from overwork and had arranged for a year's rest and study. His nature, however, did not permit him to seek rest in idleness. Nevertheless, the change of scene and activity accomplished the desired result, and Dr. Metcalf returned to the United States in improved health and took up the work of the pastorate at Taunton, Mass. From 1910 to 1920 he was minister of the Unitarian Society at Winchester, Mass., and from 1920 to the time of his death he was minister of the First Parish, Portland, Maine. The regard in which his ministerial labors were held was fittingly shown by the award of the degree of Doctor of Divinity in 1920 by the Meadville Theological School. His influence was especial-

ly strong among men. This was evident at the funeral in his Portland church, which was filled with men of all stations in life, ranging from justices of the Supreme Court to ordinary workmen.

The second absorbing interest in Mr. Metcalf's life was astronomy. Apparently his passion for this science was present throughout his life. When a boy of twelve years, he carried home from Sunday school Proctor's "Other Worlds than Ours." At about the same time his interest was further aroused by a solar eclipse. He found a lens in an abandoned house, and did odd jobs for his mother in order to earn the sixteen dollars necessary to mount it. He bought his first photographic telescope while in Burlington. This was a second-hand instrument provided with a dome, which he obtained in New York State in winter and conveyed across Lake Champlain on the ice on sledges. It had a narrow escape, as the ice cracked in one place. The horses jumped clear, leaving the dome balanced across the fissure. The cost of this outfit was five hundred dollars, an amount which, taken in connection with a small salary and a wife and two small children, constituted a real sacrifice for all concerned.

Dr. Metcalf's interest in astronomy became prominent during his studies at Oxford and later at Taunton, where he established an observatory of his own. He not only made astronomical observations of great value, but these observations were carried on with telescopes of his own construction. During a very busy life he discovered six comets, a number of variable stars, and forty-one minor planets. In the summer of 1921 he made the really remarkable record of discovering three comets within two days. All of these were independent discoveries to him, although later it was learned that one of them had been previously seen by another astronomer. The remaining two, however, were new. These comets, as well as others, were found by the use of a comet-seeker made by himself.

It was in applied optics, perhaps, that his highest scientific work was done. As an expert in this line he had no superior and probably no equal in this country. He not only computed the curves for his lenses, but he possessed a genius for bringing them to perfection. Altogether he ground many lenses. Perhaps the most notable of these was the sixteen-inch doublet, a photographic instrument which has been in use at the Harvard Observatory for many years. He also constructed a ten-inch photographic triplet, which proved to be an admirable instrument and of great use in the work of the Harvard Observatory. At the time of his death he was at work on a thirteen-inch triplet, the largest telescope of this type ever attempted. It is doubtful whether at the present time in this country there is anyone who can complete the work on this lens and bring it to the degree of perfection which Mr. Metcalf would have achieved.

For his discoveries of comets Mr. Metcalf received five medals from astronomical societies. He was a member of the American Astronomical Society and often attended its meetings. He was a Fellow of the

American Academy of Arts and Sciences. For many years he was Chairman of the Committee to visit the Harvard Observatory, and a member of the Visiting Committee of the Ladd Observatory.

The third interest in Mr. Metcalf's life was associated with the Great War. Soon after the United States entered the conflict, he was granted a leave of absence by his Winchester church and became a Secretary of the Young Men's Christian Association. He sought service at the front, and passed through many scenes of intense physical and mental strain, and placed his life in danger as freely as any soldier. By choice he shared the perils and privations of the privates, and frequently relieved some exhausted man of a portion of his burden. He made heroic and successful efforts at times to get food and other supplies to men at exposed points, and passed nights of wretchedness in dangerous positions within the bombed area. He refused promotion which carried with it greater ease and higher rank, preferring to share the lot of the common soldier. His conduct endeared him to many of his associates. He was cited for special courage at Chateau Thierry. These experiences illustrate not only his patriotism but his love and sympathy for his fellow men. Doubtless, also, he had a certain love of high adventure. From the war he returned home with a different expression on his face, that of one who had looked squarely into the face of death.

Hardly less notable than his achievements in the war were his later journeys and labors in Roumania, where he visited many parts of the country and assumed considerable risks.

Aside from his European travels while on official duties, he made several excursions to Europe, either with his family, or as the conductor of parties containing many of his acquaintances and friends. Besides the duties of a large parish and astronomical studies, he also found time for numerous lectures on scientific and popular topics, and wrote occasional scientific articles and short poems of a religious nature. It is difficult to see how he found time and strength for all these activities, but his energy and enthusiasm were intense. His rest consisted in hurrying from one form of activity to another.

Dr. Metcalf was a frequent and welcome visitor at the Harvard Observatory. When on the track of some new discovery, his enthusiasm was infectious. He had a strong friendship and deep admiration for the late Director, Edward C. Pickering, who in turn had a keen appreciation of Mr. Metcalf's versatile talents. His loss is deeply felt by the members of the Observatory staff. In large measure they share the sorrow of his going with Mrs. Metcalf and their two children, Mrs. Eldridge F. Stoneham and Mr. Herbert E. Metcalf.

> Shall the rose bloom anew, and shall man perish?
> Shall goodness sleep in the ground, and the light
> of wisdom be quenched in the dust? Their winter too
> shall pass away; they also shall live and bloom again.
> Beauty shall spring up out of ashes, and life out of death.
>
> Easter Greeting.
> Words by Mr. Metcalf.

THE MOONS OF MARS.

By ROSCOE LAMONT.

During the summer of 1924 when Mars was nearest the earth, numerous references were made in the papers to the statement in Jonathan Swift's "Gulliver's Travels," published in 1726, that the astronomers of Laputa had discovered that Mars has two moons, the inner one revolving about the planet in 10 hours and the outer one in 21½ hours; no such bodies being known to the astronomers of this earth until 1877, when Professor Hall at the Washington Observatory discovered the two moons; the inner one being found to revolve in 7 hours 39 minutes and the outer one in 30 hours 18 minutes. Exclamations such as "Marvellous!" "Was Swift a Wizard?" "A Second Mother Shipton!" led me to make a little inquiry into the matter with the following result.

After Galileo discovered four satellites of Jupiter in 1610, Kepler stated that probably Venus, Mars and Saturn, as well as the earth and Jupiter, had moons revolving about them. As the earth has one moon and Jupiter was found to have four, two would be about the right number for Mars, and it is not strange if the astronomers of Laputa, about 1726, discovered the two moons. And now it will be well to quote just what Swift says in "Gulliver's Travels." This is never done. In the "Voyage to Laputa," Chapter III, it is said:

> "They have likewise discovered two lesser stars, or satellites, which revolve about Mars; whereof the innermost is distant from the center of the primary planet exactly three of his diameters, and the outermost, five; the former revolves in the space of ten hours, and the latter in twenty-one and a half; so that the squares of their periodical times are very near in the same proportion with the cubes of their distance from the center of Mars; which evidently shows them to be governed by the same law of gravitation that influences the other heavenly bodies."

This shows that Swift was something of an astronomer and understood Kepler's third law, which he states, and how to make use of it. The inner moon was said to be three diameters of the planet from the center of Mars. The diameter of Mars according to modern astronomers is 4230 miles, but in Swift's time this length was not very accurately known, and in Roger Long's astronomy, Vol. 1, page 339, published in 1742, the diameter of Mars is given as 4800 miles. Three times this is 14,400 miles. Suppose another moon to revolve about the earth at a distance from the center of the earth of 14,400 miles. Our present moon revolves in 27-1/3 days at a distance of 238,840 miles. How long would it take another moon to go around the earth at a distance of 14,400 miles from the earth's center? By applying Kepler's third law which the Laputans used in such cases, that the squares of the periodic times are proportional to the cubes of the distances from the center of the earth, we have,

$$x^2/27\tfrac{1}{3}^2 = 14400^3/238840^3$$

and from this equation x is found to equal .4046 days or 9 hours 43 minutes, nearly 10 hours. Why, then, should not a moon revolve around Mars in 10 hours at a distance from its center of 14,400 miles? It wouldn't do it, but the Laputans may have thought it would. Gulliver says of the Laputans, in Chapter II, "They are very bad reasoners," and so they may have made the inner moon revolve around Mars in 10 hours because it would do the same thing around the earth at the same distance. The outer moon was distant from the center of Mars five diameters of the planet. How long will it take that moon to revolve around Mars? Kepler's third law will give it $x^2/10^2 = 5^3/3^3$. Gulliver said that the period was 21½ hours, and that the squares of the times of revolution of the two moons were *nearly* in the same proportion with the cubes of their distances from the center of Mars. This equation gives 21 hours, 30 minutes, 59.6 seconds. The Laputans were bad reasoners, and they always went out accompanied by a flapper, so Gulliver says, but they knew how to use Kepler's third law and that was all that was needed.

The reason why Swift took the distances of the moons from the center of Mars as 3 and 5 times the planet's diameter was probably this: He had read in David Gregory's astronomy, published in 1713 (Vol. 1, page 25, of the second edition of 1726), the following about Jupiter's satellites: "Jupiter has four; the innermost of which revolves about in 1¼ of a day, at the distance of 5-2/3 semi-diameters of Jupiter from his center; the second revolves in 3-1/5 days at the distance of 9 semi-diameters." 5-2/3 and 9 semi-diameters are 2-5/6 and 4½ diameters, so Swift took those of Mars as 3 and 5.

Or, having fixed the distance of the inner moon from the center of Mars at three diameters of the planet, Swift may have reasoned like this: A moon at a distance from Jupiter's center of about three of his diameters revolves in 1¼ of a day or 30 hours. A moon at a distance from the earth's center of three of the earth's diameters would revolve in about 20 hours (as he would find). So let's have a moon at a distance from the center of Mars of three of his diameters go around in 10 hours.

In Sir Robert Ball's "Reminiscences and Letters," edited by his son, there is the following, page 171:

"Dr. Bernard, Bishop of Ossory (who was then Dean of St. Patrick's), wrote to him in April, 1908:

'A friend tells me that he has been informed on good authority that when Swift made his wonderful statement in *Gulliver's Travels* (Pt. III, *A Voyage to Laputa*, Ch. 3) about the number of satellites of Mars and their periodic time, he was not merely romancing, but writing down what some man of science had told him. I feel sure this is not the case, and would be very glad to have your view.'"

"The reply was as follows:

'No doubt Kepler interpreted Galileo's anagram about Saturn as a triple object to mean that Mars had two satellites. We are told that Micromegas (1752) *saw* them, but Voltaire obviously borrowed this idea from Swift. Cyrano de Bergerac seems also to have predicted them in the same way as Swift.

'But it is, I believe, quite certain that these are all random guesses. It is impossible that they could be seen with instruments of a date earlier than that

of the famous telescope at Washington by which they were discovered in 1877.

'No doubt the notion that Mars had satellites was suggested by the consideration that

Venus	had no	satellites.
Earth	"	1.
Mars	"	*x*.
Jupiter	"	4.

'It did not require any great genius to say that *x* was probably 2. It is absolutely certain that no one predicted the periodic times, and the most astonishing 'shot' in the whole of science is Gulliver's statement that the period of one of these satellites was so little as ten hours. Had Swift consulted an average astronomer he would have been told, 'Oh, yes, certainly, let Mars have two moons. That is *quite* reasonable, but the ten-hour period is preposterously short. Make it ten days and it will also look quite reasonable.' The fortunate circumstance was that Swift drew on his own genius and not on the scientific conventions.

'My own theory is that Swift wrote (under Arbuthnot's advice) ten *days*, but by a clerical error ten *hours* was printed!'"

If Swift wrote ten *days* and the printer made a mistake, how did Swift draw on his own genius? And what kind of a being is "an average astronomer" who would tell Swift that a moon, at a distance from the center of Mars of three of his diameters, would require ten days to revolve about the planet? One of Swift's Brobdingnags would walk it in less time than that. "An undevout astronomer is mad," so Young tells us, but what would he have said of that "average astronomer"? Swift stated to Pope in November, 1726, that an Irish bishop had said that "Gulliver's Travels" were so full of improbable lies that he hardly believed a word in the book. Swift would have said something very similar to that "average astronomer," as he had already seen in Gregory's astronomy that the innermost satellite of Jupiter, at a distance from the center of Jupiter of 5-2/3 semi-diameters of the planet (250,000 miles), revolved in 1¼ of a day. According to Ball's theory, Swift wrote ten *days* and the printer by mistake made it ten *hours*. We then have the inner moon revolving in ten *days* and the outer one in 21½ *hours*. Or maybe Ball thought the printer made two mistakes.

It is quite likely, as Sir Robert Ball says, that Swift wrote under Arbuthnot's advice (but not ten *days*). In Boswell's life of Johnson it is said: "Talking of the eminent writers in Queen Anne's reign, he observed, 'I think Dr. Arbuthnot the first among them. He was the most universal genius, being an excellent physician, a man of deep learning, and a man of much humor.'" Swift and Arbuthnot were great friends, and what Swift lacked Arbuthnot could supply. His "Essay on the Usefulness of Mathematical Learning" is often quoted.

But when it comes to discovering moons, Anna Kingsford has got Swift, Voltaire and Cyrano de Bergerac beaten before they start. In her book "Clothed with the Sun," published in 1889, page 282, she says:

"Here is Jupiter! It has nine moons! Yes, nine. Some are exceedingly small. And, oh, how red it is! It has so much iron. And what enormous men and women! There is evil there too. For evil is wherever are matter and limitation. But the people of Jupiter are far better than we on earth. They know much more; they are much wiser."

No doubt about it. In 1889 astronomers on this earth only knew of four moons of Jupiter, those discovered by Galileo in 1610, but the ninth one was discovered in 1914 by Professor Seth B. Nicholson at the Lick Observatory. It is "exceedingly small"; supposed to be about fifteen miles in diameter; just about a good football for Swift's Brobdingnags, but no "average astronomer" would have found it.

Washington, D. C.

COLLIGATION OF THE MARTIAN MARKINGS.

By G. H. HAMILTON.

The subject upon which I am now writing is the colligation of the Martian markings and what the colligation shows us. I have long felt that the detail on *Mars* was connected up into a complete whole over the planet's surface. That the northern hemisphere was, in a sense, a dormant counterpart of the southern.

Professor Lowell confirmed Schiaparelli in stating that the canals between points followed great circles and were therefore the shortest route between stations on the surface of the planet. Observers have, since his time, drawn these canals and even measured them; but, through errors in drawing and measurement, have utterly failed in any accordance in their results, for the instrument, the site and sight, had to be depended on.

Let us now start with the suggestion of arcs of great circles. If the canals are arcs of great circles, one would expect to find arcs of the *same* great circle—or possibly strings of oases that would definitely indicate one. This will be difficult since our means of measurement are subject to so many errors that even if points have the appearance of being on great circles, when put to the test they will be found to be appreciably off—the artifice is in experiment—if one is convinced that certain points really are on a great circle, one may compute the circle which fits them best and place the points on it. This done, for at least two sets of points, there will be pairs of oases or other markings determining other great circles—and so on.

During the opposition of 1924 I was greatly struck by what appeared to be meridional great circles on the disk from cap to cap, or at least from northern limb to southern cap. Upon these apparently meridional canals I observed oases and coastal points or "carets" as Dr. Lowell called them. My drawings also showed that these canals were crossed at different points along their length by other canals having the appearance of other great circles, and these had other points of a similar kind along their length.

The drawings reproduced will illustrate what I mean. Most of my readers will admit their artificial look, but will feel at once that they

are too artificial. This artificiality will, I think, be shown as a necessary consequence from what follows.

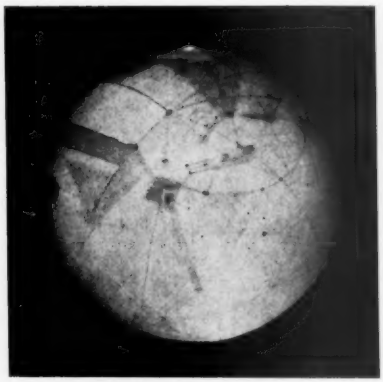
Along with these drawings I have added six copies of a globe of *Mars* so taken that every part of the planet is shown. In comparing it with the drawings the similarity must at once become apparent. Now anyone can fit his drawings on a globe, and the result will be a similarity between the two—but this globe has not been positioned from the drawings—the detail has been mechanically placed upon the globe according to the great circle idea.

In starting the globe I used the meridional canals, at least the measures of the points seen upon them. Each of these points was computed accurately from the measured positions on an average of six individual drawings. It was found that they varied in longitude by no more than a couple of degrees, except at the south cap or north limb where the positioning could not be expected to be as accurate. The individual measures of all these points along the canal were therefore meaned in longitude and the result used for each meridional canal on the globe—each point having its own latitude but the mean longitude for all. After these points were plotted, those that approximated to other great circles cutting the original meridional ones were studied, and found in most cases to lie very near, if not actually upon, the mean circle passing through them. Several points seemed exceedingly well placed, for a number of great circles passed through each. I took these points as standard and proceeded to describe other circles through them where I saw canals in my drawings. It was soon a simple matter to identify the Martian topography. Every canal, oasis and coast line—even that bounding *Thaumasia* or "the Eye of Mars" is on a great circle or is an arc of a great circle which has at least two other points upon it—the average for each circle would, I believe, be about six.

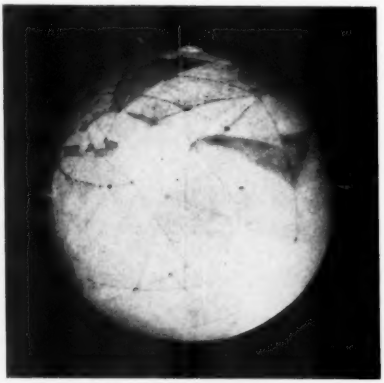
If this idea is not correct, no adjustment of these great circles on a globe could build up the topography as we see it on the planet—at least one could not do it with a minimum of great circles, i. e., with only those circles that are known to correspond with already existing canals and, indeed, with only those canals which are easily visible to all observers under favorable conditions. It would of course be possible to *fill* the globe with circles and search for those that would fit a *fair* representation of what we see.

The differences have been taken between the obtained positions of points on the globe, and the measured positions from the drawings. The mean difference between the globe and the measured positions for all points is 1.02 degrees in latitude and 1.52 degrees in longitude. The mean probable error of the measured points from the true position was found to be 0.92 degrees in latitude and 1.22 degrees in longitude. That is, the differences between the points on the globe and the corresponding ones in the drawings are of the same order as the errors of the drawings.

The outline of the "seas" having thus been got from a continuation

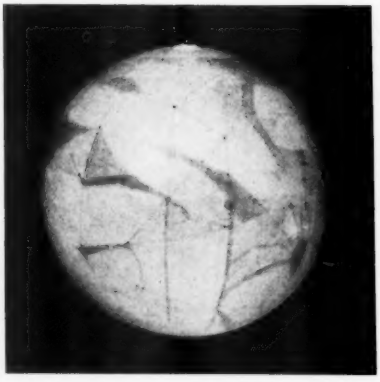


I $\omega = 60^\circ$



II $\omega = 120^\circ$

III $\omega = 180^\circ$



IV $\omega = 240^\circ$

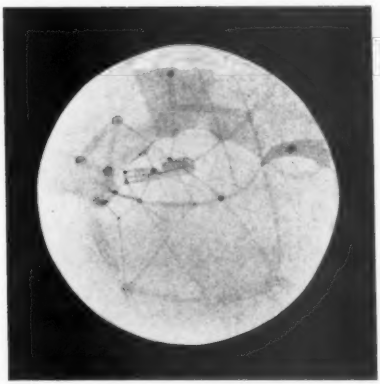
V $\omega = 300^\circ$

VI $\omega = 360^\circ$

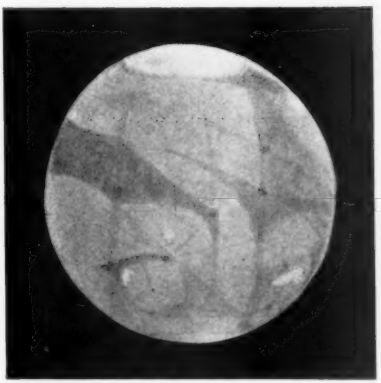
PHOTOGRAPHS OF DRAWINGS OF MARS ON GLOBE, 1924,
BY G. H. HAMILTON.

POPULAR ASTRONOMY, No. 328.

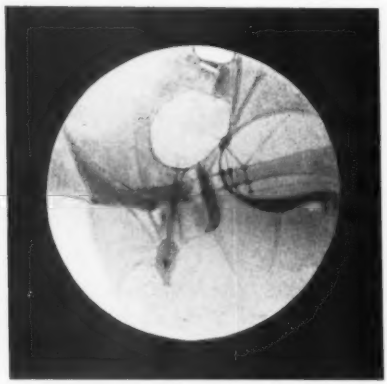
PLATE XXVII.



I Aug. 24 $\omega = 90°.5$



II Aug. 8 $\omega = 224°.8$



III Sept. 8 $\omega = 300°.4$

DRAWINGS OF MARS, 1924, BY G. H. HAMILTON.

of known arcs of great circles indicates in itself (apart from any other evidence) that their boundaries are great circles; that is, the "seas" are artificial.

The fact that the dark areas changed their position and area by the use of different canals I have already dwelt upon in "The 'Seas' of Mars";[1] but a full appreciation of what has taken place can only be obtained from a globe made in the manner described above. As the globe shows, the *Margaritifer Sinus*, though at first glance the same as usual, is in reality some ten degrees of greater longitude than ordinarily depicted. It can be seen that the whole *Sinus*, northward to the "Pearl" has become bent or curved where it is generally seen with a north and south bounding edge on the preceding side. The *Margaritifer* or "Pearl," sometimes called *Oxia*, is apparently fixed, so is the canal in the *Sinus*, the continuation of the *Oxus* to the south; but where this canal is usually shown as bounding the following edge of the *Margaritifer Sinus* and forming the left hand edge of *Aromatum*, it was seen to be nearly centrally placed in the dark area. The *Margaritifer* in 1924 was seemingly bounded by a continuation of the Djihoun and a northern continuation of Lowell's *Kanah*. At one time in the opposition it had gained on one side without losing on the other, making the *Sinus* very broad, but on the globe the complete shift is made visible.

The other striking example is in the *Syrtis Major* and relates to the extremely dark portion of it in the northern hemisphere, the *Euxine*. Where the tip of the *Syrtis* is usually given as in longitude 284°, it is shown on the globe as about 294°, a seeming ten degree shift. This is not a mistake in the globe, for although the *Syrtis* was placed upon it by means of the great circles, it yet corresponds on the average with all my drawings at this opposition. To further show the reality of the shift, *Hellas* has also moved to a similar region above or south of it, making the whole configuration similar to what it was before the shift. This again is proved since the great circles in that region show an outline of the old *Hellas* south of where the *Syrtis* used to be. This is also shown in the drawings, the area that once was a part of *Hellas* and now left over by the shift, is shown as a dark area. That is, *Hellas*, which has been usually considered as a permanent white area, can at least in part turn dark.

From the geometry of the globe the canals that have usually been considered double have turned out to be narrow lunes. It has always been said against the doubles that those who have seen them have believed in the great circle character of the canals and have at the same time called the doubles "parallel" canals. For that to be so, one or other or both of the canals must be on small circles.

Very few doubles were seen last year, in fact I have only two instances of any, and they were observed only once each, and on different parts of the disk. The double *Gihon* is not counted as one of these, since it is much broader than the average double and can hardly be

[1] The "Seas" of Mars, Popular Astronomy, December, 1924.

considered as such. In the dark regions the canals are less visible than on the deserts, especially when they bound these areas. For this reason doubles are not often seen as such in the southern hemisphere and accounts for the lack in 1924.

There are many instances on the globe here shown, where the coast lines are formed by great circles passing through oases in the dark areas. The great circles are so close together that for the distances equal to the length of the average double canals they are to all intents "parallel" and would be drawn so if visible as doubles. During those seasons on *Mars* when the northern desert hemisphere is turned towards us, they become apparent as the great circles cross the deserts. The *Euphrates* is a case in point, where it is drawn "parallel" between the *Icarii Luci* and the *Ismenii Luci*, but obviously narrows as it extends northward to *Arethusa Lucus* and the north pole.

Bearing in mind that all detail seen in the southern hemisphere in 1924 was reproduced by means of great circles on a globe, it is obvious that these same great circles traversed the northern hemisphere, which could only be seen in part. It was found that all the known northern detail seen at previous oppositions fitted these great circles formed from the 1924 opposition. This in itself is a splendid check on the whole theory.

The giant water courses with which many people have endowed the Ruddy Planet; the "digging" of canals miles in width, is simply a myth; but a far more wonderful, as well as economical engineering feat, shapes itself before our eyes. The canals are indeed water courses, invisible, as Dr. Lowell has always stated, but these water courses probably encircle the globe completely and manifest themselves to our eyes only along those portions of their length where they are turned to use.

Mandeville, Jamaica, B. W. I., 1925.

THE GREAT METEOR OF MAY 11, 1922.

By CHAS. P. OLIVIER.

On the night of May 11, 1922, at $11^h\ 15^m$ E. S. T., a great fireball or meteor appeared over North Carolina, and travelling northward, burst over Amelia County, Virginia. The writer's attention was called to this meteor by sensational notices that appeared in the daily papers during the next few days. From these it was evident that the reports must have referred to a remarkable phenomenon, hence efforts were made to secure authentic data.

On behalf of the American Meteor Society, large numbers of standard questionnaires were mailed to high school superintendents, postmasters and certain other persons. In addition large numbers of personal letters were written, following up the return of the question-

naires. Requests for information were also published in several daily papers. Thanks to this campaign a large amount of accurate and interesting data was gathered, as the larger part of the persons addressed sent prompt and useful replies. In all twenty-one questionnaires, and fourteen letters were received, while conversations were held with ten persons who actually saw the meteor.

By rare good fortune the whole path of the meteor was accurately observed by S. A. Ashe, Jr., at Raleigh, N. C., and Rev. Lewis N. Taylor, near Roanoke Rapids, N. C. These observers were not far from the point below the south end of the body's path.

At the University of Virginia, which was about sixty miles north of the exploding point, observations were made by five students, two being members of the astronomy class, and three members of the Medical Faculty. Finally accurate observations were made of the exploding point by Dr. Robert J. Styres, of Jetersville, and J. A. and M. M. DeKrafft, at Amelia C. H., all of whom were very near the point above which the explosion took place.

Numerous other observers sent in observations, which were used as checks, and more especially in determining the linear velocity.

Below follows a list of all observers with the coördinates of their places of observation and their estimates of duration of flight:

	Long.	Lat.		Wt.
	° ′	° ′	s	
S. A. Ashe, Jr., Raleigh, N. C.	78 40	+35 46	4	10
A. C. Barclay, Crewe, Va.	78 10	37 13	5	5
M. K. Blackwell, Kenbridge, Va.	78 8	36 57	1-2	a
Mrs. Elinora Boisseau, De Witt, Va.	77 41	37 2	60	b
J. A. Brooks, Nottoway Pond, Va.	78 6	37 7	3½	2
Miss Grace D. Christian, Blackstone, Va.	78 1	37 5	45	b
A. S. Daniel, Danieltown, Va.	78 0	36 55	3½	5
M. L. Daniel, Danieltown, Va.	78 0	36 55		
T. C. Goodwin, University of Va.	78 30	38 2		a
J. A. and M. M. DeKrafft, Amelia C. H., Va.	78 3	37 20	4	4
J. C. Elgin, R. G. Gulley, University of Va.	78 30	38 2	3	5
Miss Caroline Ellis, Franklin, Va.	76 57	36 42	3	3
G. B. Harris, Norlina, N. C.	78 16	36 27	1	a
John Hethorn, Kenbridge, Va.	78 8	36 57		
C. K. Holsinger, Lawrenceville, Va.	77 50	36 48	3	3
R. A. Kindley, University of Va.	78 30	38 2	4	3
W. S. Manson, Kenbridge, Va.	78 8	36 57	60	b
Dr. D. C. Smith & two others, University of Va.	78 30	38 2	3½	8
Dr. R. J. Styres, Jetersville, Va.	78 9	37 18	5	10
A. J. Sutherland and family, Sutherland, Va.	77 34	37 10	6	5
Rev. Lewis N. Taylor, Roanoke Rapids, N. C.	77 42	36 28	4½	5
Geo. L. Walker, Kenbridge, Va.	78 8	36 57		

(a. Apparently only part of path seen.)
(b. Evidently refers to duration of sound.)

In addition the writer talked with several persons at the University of Virginia, who saw the meteor but made no observations. Some general information was also obtained from press reports and letters were received from others giving names and addresses of observers. During the whole summer the writer kept in close touch with the late Dr. Thomas L. Watson, State Geologist, whose field observers made

inquiries and by whose direction search for the fragments was conducted.

The Beginning Point.

A study of the data proved that the beginning point could be fixed, using the Raleigh (S_2) and Roanoke Rapids (S_3) observations, along with those made at the University of Virginia (S_1). Employing the methods developed in *Contributions from the Lick Observatory No. 5* by J. M. Schaeberle, the following constants were computed for the University of Virginia and Raleigh, N. C.

For S_1 : $\lambda_1 = 78° 30'$, $\phi_1 = +38° 2'$, $\phi_1' = 37° 51'$, $\log R_1 = 9.99946$, $\theta_1 = 214° 25'$
For S_2 : $\lambda_2 = 78° 40'$, $\phi_2 = +35° 46'$, $\phi_2' = 35° 35'$, $\log R_2 = 9.99950$, $\theta_2 = 214° 15'$
$\therefore \log k = 8.59731$.

The actual observations were as follows:

At S_1: $h = 42°$, $a = 344°$
S_2: $h = 75°$, $a = 242°$
S_3: At zenith.

It happens that S_2 and S_3 are on opposite sides of the beginning point, hence corrections to the observed altitudes were necessary. For S_2, $h = 67°$ was finally used, which gave for S_3, $h = 79°$, quite as close an agreement with the observations as could probably have been expected. The other data for S_1 and S_2 were not changed. Several other corrections to the data were tried, but none gave equally probable and satisfactory results. It may be added that the changes made in the observed altitudes decreased the deduced result, therefore the latter must be considered as a minimum rather than maximum value.

As eight persons made observations at S_1 it was necessary to combine the data. Two, working together, plotted part of the path on a star-map, trees preventing their seeing the lower half of the path. For three, the altitude observations were used, but the azimuths were much too rough. For the other three, observing together, both altitude and azimuths were used, along with a separate estimate of its slope to horizon as it passed the moon. The writer is responsible for the combined result used, which he obtained after considerable study, using a celestial globe in the work.

It is found that the meteor started over the point $\lambda = 77° 50'$, $\phi = 36° 08'$ at an altitude of 130.2 miles. It so happened that the solution and the check give exactly the same height to within 0.1 mile.

End Point.

Equally good data, *i. e.*, altitudes and azimuths correct within a very few degrees, were secured at S_1, S_2 and S_3 for the end point, but better data are at hand. The meteor burst east to northeast of Jetersville at an altitude of 30° and south of Amelia C. H. The sounds were estimated to take 10-22 seconds to reach Jetersville. This gave 2.2 miles as its height when exploding. Using the time elapsing between the explosion and when it was heard from Crewe, Jetersville, Amelia

C. H., Blackstone, Sutherland, Lawrenceville, Kenbridge, and Danieltown, and knowing the velocity of sound, circles with proper radii could be drawn with these places as centers. The adopted point was also checked by the observed azimuths. The distance of this point from S_1 was easily measured upon the map and the coördinates observed at S_1, $\alpha = 248°.3$, $\delta = -39°.6$, being used, we find the explosion took place over point $\lambda = 78°\ 3'$, $\phi = +37°\ 18'$ at an altitude of 6.1 miles. Giving the Jetersville value larger weight, we finally adopt 4.0 miles as the height of the explosion.

Whole Path.

Simple calculations now show that the projection of the path is 81.5 miles, while the path itself is 151.6 miles long. The mean of thirteen estimates gives 4.13 seconds as the duration, hence the average observed velocity is 36.71 miles per second, or 59.1 km per second. The meteor fell meantime from 130.2 miles to 4.0 miles above the earth's surface. Its direction of motion was toward a point 7° 50′ west of north.

Path in Space.

From data given it is calculated that at the end of its path the meteor was coming from the point with altitude 57° 9′, azimuth 352° 10′. The correction for zenith attraction is —20′, therefore corrected altitude is 56° 49′. Turning this into equatorial coördinates, we find $\alpha = 219°\ 10'$, $\delta = +4°\ 22'$. The following orbit was then calculated by Bauschinger's method:

Observed velocity	= 59.1 km/sec
Corrected velocity	= 58.0 "
Heliocentric velocity	= 70.9 "
Orbit hyperbolic	
Semi-major axis	= —0.27
Eccentricity	= 3.3
Inclination	= 23°
Node	= 50°.6
Perihelion	= 292°

It should be emphasized that the velocity used above is the average within the earth's atmosphere. As is well understood, the velocity of entrance must have been somewhat higher, as retardation was taking place during the whole time of visibility. The above elements are therefore merely approximate.

Lack of space forbids giving many estimates. At Raleigh it fell 15° before bursting out to full brilliancy; from then on it appeared half the diameter of full moon. At the University of Virginia the average estimate was about one-third that of the moon. Estimates from places near the explosion vary from one-half to about the size of the moon. Far the larger number of observers report its color white, but near the last explosion there seems reason to think it was more yellowish or even red at last moment. Perhaps the red sparks reported by many confused some as to the real color. It is probable that the meteor gave

a light equal to that of the full moon for at least thirty miles on either side of its path during the last half of its flight. Reports as to a train are rather contradictory, but it seems safe to conclude that the train was of very short duration and existed only for a part of the whole path.

From Crewe, Nottoway Pond, Lawrenceville, Jetersville and Sutherland, it was reported to have burst into 2, 2, 4, 3 and 2 parts respectively. There seems no doubt that there were two large and several smaller fragments. Dr. Styres at Jetersville heard the first sound ten seconds after explosion, then two others at 5 and 7 seconds respectively, sounding like firing of a heavy cannon.

From practically all the Virginia stations south of this point very loud sounds were reported, in some cases preceding actual explosion. It was compared to distant thunder at several stations, not very near the path. Much of this sound was due, of course, to the shock-wave which accompanies the rapid passage of a projectile through our atmosphere, and was not caused by the final explosion. The former would roll like thunder, the latter be over very suddenly.

The results here given are considered more trustworthy than usually obtainable for such bodies, because they were based upon the observations of several educated men who made quite accurate notes of the phenomena. The data of the numerous observers who saw only part of the path, or who made less accurate notes, were used only as checks, except the time estimates. The agreement of these last is most remarkable and the writer feels considerable confidence in their average.

Finally he desires to express most sincere thanks and appreciation to all who, often at some loss of time and much trouble, aided in collecting the numerous data used. He believes that the cordial coöperation of the people of North Carolina and Virginia in this piece of scientific research has led to the calculation of a much more accurate path than can usually be derived for a meteorite.

STAR-DUST AND CLAY.

I do not know from whence we came nor why,
Nor whither bound. 'Tis true there comes to me
Oft-times a whisper—Immortality?
Ah, wisps of Beauty that enchant the eye:
The sunset flush, the stars, the morning sky,
The winds that blow across a sapphire sea.
I know I am, and all of these things be.
And more: that Beauty was not born to die.
If God created man from common clay,
For soul, I think He must have found a cloud
With star-dust from the summer Milky-Way
Caught in its misty summit rosy browed.
And mixed it with the dust of earthy gray—
I still look to the stars with head unbowed.

STERLING BUNCH.

Springtown, Texas.

A WOODEN TELESCOPE TUBE.

By B. F. GILLMOR.

The amateur with a taste for first hand astronomy and but a small amount of money to spare is likely to fancy that he might try his hand at reflector building, but on account of metal tubes, metal mountings and the like, feels that he will need an expensive shop equipment to succeed in his efforts. Wood, therefore, offers itself as the best medium for a first essay. The mounting, also, may be made almost entirely of wood. Being soft it may be cut, shaped and fitted with ordinary tools and a pleasurable experiment may thus be carried on without great expense.

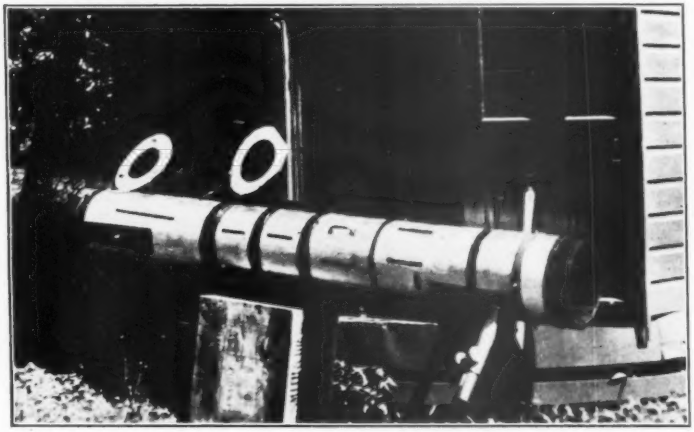


Fig. 1.—Front end of tube. Eye tube is turned downward, speculum door is closed, the cradle carrying tube is resting on the box. On top of tube are shown two stop diaphragms for cutting down aperture and the end cap or stopper.

A wooden tube is not the best telescope tube in the world, being unstable with changes of humidity, none too rigid under stresses and, worst of its frailties, subject to annoying convection currents within it. But for all that, it is the very best material imaginable with which to acquire experience in telescope building and will give the amateur an inexpensive carrier for his first efforts in speculum making and be a means of enabling him eventually to turn out a better instrument in metal.

The accompanying photographs and drawings illustrate the manner in which the writer built a tube approximately twelve inches in diameter and seven and a half feet in length. Four nine-inch specula of 81.

85.5, 91.5, and 93.5 inches focal length have been tried out in it. This tube has been cut over for varying focal lengths and for varying suspensions of the secondary mirrors until it looks not unlike Joseph's well known garment. It is not so beautiful, but in the making of it and the specula the writer acquired valuable experience and delightful memories, worked out of his mental complex a suppressed desire dating back to boyhood, grew some callouses on his hands and temper, got his whiskers full of pitch and shavings and, indeed, made other more or less permanent acquisitions too numerous to mention. He still feels that it was worth the effort.

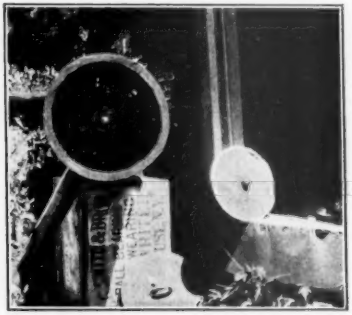


Fig. 2.—Upper end of tube, showing diagonal suspension on four rays of clock spring steel. The manner of locking or tightening a hoop with a stove bolt is shown. The flat inner faces of the staves are distinguishable. In the observatory door are seen a stop diaphragm and the speculum cap.

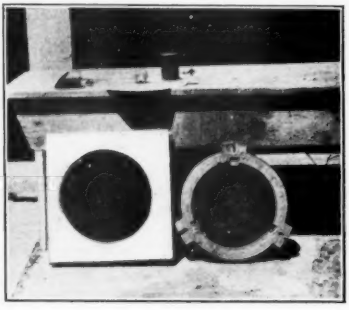


Fig. 3.—Here is shown a ten-inch speculum cell block made of two ⅞-inch white pine boards glued and screwed together and marked for cutting, the center having been sawed out. To the right of it a nine-inch speculum in its wooden cell. On the bench above are a diagonal and a single band suspension system, its central part being made partly of wood. A paper diagonal cap is also shown here.

The manner of laying off a pattern for the staves is shown in the drawing. A smaller tube and a larger tube than the one built are also planned in the drawing. An eighteen stave tube works out well in the larger diameter, but for a six-inch speculum a nine stave construction would be better.

After ascertaining the requisite dimensions by measurement of the plan drawing, staves were worked out at the bench. The tube was then assembled over a form made of four wooden discs that were padded on the rims and strap hoops of iron, drawn together with stove bolts, held the tube together until the glue was hard. The hoops were then cautiously moved along the tube and back while areas were being shaped to round with a plane. After this the hoops were tightened down and marked for screw holes. The hoops were then drilled, one at a time, put back on and wood screws inserted and set up tight into each stave.

A wooden flange of three-ply wood was screwed onto the end of the tube. Three protuberant portions at equidistant intervals were left for the bolts that were to support the wooden speculum cell. The speculum cell was adjustable by varying pressures of these bolts through flange and cell against felt washers made of pieces of an old hat and by this means the speculum is "squared on." It works well and holds the speculum in adjustment for weeks or months.

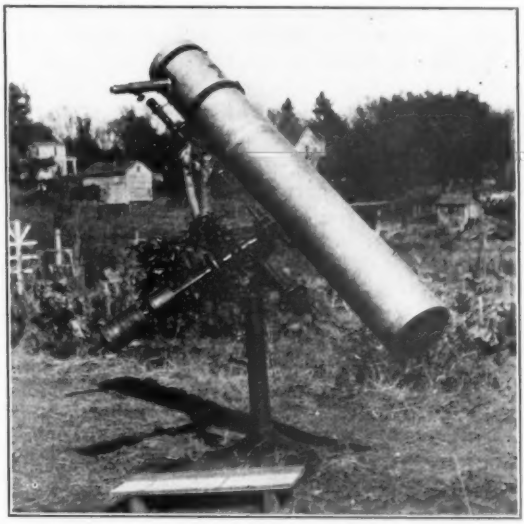


Fig. 4.—This view shows a metal tube of number fourteen sheet-iron with welded seams. It shows small cast discs for accurate counterbalancing. The speculum cell is also a welded job. This instrument is very satisfactory and experience with the wooden tube made the making of it much easier.

A padded diaphragm of "beaver board" serves when crowded into the tube just ahead of the speculum as a cap for its protection when not in use. Pads of cotton and a surgeon's bandage close the interval between the cell and the supporting flange at the end of the tube and keep the air away from the silver film when the instrument is capped.

The whole tube rotates in a cradle. The cradle, composed of three iron hoops and a wooden base, clasps the tube and is held tight by three brass hasps that may be released for rotating the tube.

The tube was varnished inside and out and a coat of flat black applied to its interior; and it was so first used. It was then covered with tin foil to insulate it from terrestrial radiation and its performance was thereby markedly improved. Still further improvement was effected by slotting the tube, with the object in view of breaking up air currents in their incipiency.

Some charming views of the heavens were obtained. One's instrumental creations, like one's infants, are most extraordinarily fascinating, and all their idiosyncrasies are forgiven. The wooden tube (unless, perhaps, it is made rather short) is most efficient when it is nearly vertical and in that position compares favorably with a metal one. The instrument the writer has made does not, in all candor, compare with the performance of another he has that was made by a professional. Nevertheless, its revelations are marvelous—the snow fields of Mars, Jupiter's and Saturn's splendors, the lunar scenery, nebular streamers and the more than royal jewelry of clusters. These are among the treasures recovered by a key fashioned mainly of thought, sweat and pertinacity. Only a comparatively small amount of money is requisite.

To the amateur who contemplates building such a wooden tube I would suggest the use of a short focus speculum. In a short tube the faults of wooden construction are not so apparent. A six or eight inch mirror of sixty to sixty-five inches focal length should perform quite satisfactorily in a tube of this sort.

Any small telescope will perform much better quite in the open than when pointed through the draughty opening in the roof of a small observatory. The heated air waves from the breath and body of a single person, passing through the narrow opening in the small observatory pictured in the illustrations, destroyed all satisfactory seeing. It was not until the writer had set his instrument up out of doors that he realized what a really marvelous aid to vision a comparatively inexpensive reflector can be.

Every telescope should have a housing, but for a small instrument one whose roof folds or slides back is preferable to a dome and shutter. The large domes of the great observatories, having a large cubical space and wide openings are, of course, not subject to the same disabilities, but the amateur will do well to make no effort to pattern after these in making a housing for his small instrument.

One of the pictures shows a metal tube carrying a mirror of eighty inches focal length. Experience gained in making the wooden tube made making this one comparatively easy.

With it the Martian polar cap has been seen to shrink and fade to a minute bright dot. Now and then a straight dark line has been glimpsed, in addition to many of the easier seen markings upon the ball, visible whenever seeing is good.

With a telescope as a companion the out of doors takes on an entirely new breadth and meaning. The spaces of the night, the starry fields of the heavens, become one's wandering places. To have known that delight is a rare privilege.

Red Oak, Iowa.

THE SECOND STAGE IN THE REFORM OF THE PRESENT CALENDAR.

By WILLIAM F. RIGGE.

Readers of POPULAR ASTRONOMY may remember an article that appeared in these pages in March, 1924, with the title "The Reform of the Present Calendar Begun." It was there stated that the agitated reform was concentrated upon two main questions and two accessory ones. The main questions were:

1. Shall the date of Easter be fixed without changing the calendar?
2. If the same days of the year are to fall upon the same days of the week, how is this arrangement to be brought about?

The accessory questions were:

3 Shall the lengths of the months be changed, and how?
4. How are the ecclesiastical feasts to be arranged in the new calendar?

These questions were sent to all the governments of the world and to all the heads of religious denominations by the League of Nations sitting at Geneva, with the request to return an answer before March 1, 1924.

As a year has passed since that date, it will be of interest to mention the turn affairs have taken. The substance of this information is gathered from an article "Der Jetzige Stand der Kalenderfrage" by John G. Hagen, of the Vatican Observatory, in the *Stimmen der Zeit*, vol. 108 fasc. 4.

The first and second sessions having been held in Geneva in August, 1922 and 1923, the third was convened in Paris in May, 1924. This occupied itself exclusively with the two main questions mentioned before, that is, with the date of Easter and the permanent coincidence of the days of the months and of the weeks. Prudent foresight was exercised in first sounding the Holy See upon these points. As two confidential inquiries brought only evasive answers, an official invitation was sent from Geneva to the Apostolic Nuntio in Bern to have the Holy See duly represented in the first session. It was only after this had been conceded, that the Greek and Anglican Churches were similarly invited. With the old ideas of the Gregorian reform still lingering about them, it was thought at first that the question was as before an astronomical one, and the three Churches accordingly deputed astronomers to represent them. It soon became very apparent, however, that the business world had more to say in the matter than astronomy, and that the school, sport, and government systems were also affected by it.

1. The committee of 1924 was made up in this wise. The chairman

was M. Le Jonkher, of Eysinga, as a member of the League of Nations. Then Gianfranceschi, professor of physics at the Gregorian University, Rome; Eginitis, director of the Athens Observatory; and Phillips, secretary of the Royal Astronomical Society of London; as representatives of their respective religious denominations. Also the French astronomer Bigourdan, and last but not least, Willis H. Booth, head of the International Bureau of Commerce.

In passing it may be stated that the invitations mentioned before had been sent, not only to each and every government in the world, but also to every religious denomination, even to the Jewish Associations in Paris and London, the Evangelical Church in Berlin, the Union of the Reformed Churches in Zurich, the Christian Science Church in Boston, and the Confucius Society in Peking, making 18 corporations in all.

Of all these about twenty had forwarded official responses, and there were also more than a hundred schemes proposed by individuals. As was to be expected, the official pronouncements were very reserved, and even evasive. But the torrent of the individual utterances rushed all the more vehemently, because of their irresponsibilities. It is worthy of special remark, however, that not a single Church and not a single government expressed any desire for reform, and that two or three even opposed it. The Jews appealed to their holy books, and declared that their sabbath could not be touched.

2. The purpose of the third session was now to sort the schemes that had been submitted to it, and to select from the mass of the widely divergent proposals the few that showed some unanimity. These were in regard to the day, the month, and the year.

The blank day, which is to belong to no week, and is in this way to secure the firm coincidence between the days of the months and of the weeks, was much recommended, especially by banks and bureaus of commerce. It was thought that the religious scruples of the Jews and of all that believe in a divine revelation and keep the "seventh day" holy, might be assuaged by suggesting to them to make this blank day a holyday. It remains to be seen whether they will be satisfied with this solution.

A change in the months is dependent upon the acceptance or rejection of the blank day. If this is accepted, the year will have only 364 week-days, which may then be distributed over 12 months so that eight of them shall have 30 days and four 31, or over 13 months of 28 days each. The 13-month year was rejected by the business world, because it could not be divided into halves and thirds and quarters. In any case the desire was expressed to make February equal in length to the other months, and to give it 30 days.

According to common consent the year was to remain the same, not only in its beginning, but also in its intercalation of leap days, and of course also in its present reckoning according to the Christian era. A transference of New Year's day to the winter solstice, an intercalation of leap days which is to surpass in accuracy the four-century cycle of

the Gregorian calendar, as well as a reckoning from the correct year in which Christ was born, are only theories in the minds of those who do not consider themselves constrained to weigh the deleterious consequences of such innovations.

According to this frame of mind, Searle's leap week met with no acceptance. This scheme was explained by the present writer in the previous article mentioned at the beginning of the present one. It was not advocated by him, as he has been misunderstood to have done. Briefly, this method put 364 days or 52 full weeks in a common year, and 371 days or 53 full weeks in a leap year. Every year whose number ends in a 5 or 0 was to be a leap year, except when it ends in a 50 or a 00, and when it begins a new cycle or has some other definite position to be determined later. The objection to Searle's scheme was that the additional week added to a month in a leap year was a great inconvenience, and that the equinoxes and solstices, instead of swaying only one day as they do at present, would oscillate over a whole week.

3. How far the question of calendar reform has advanced, may be gathered from a few ideas that have been taken from the more than eighty communications that were sent in.

The German government had not expressed its mind, up to the last session. The Italian, on the other hand, had sent in a five-page paper, the principal object of which was a declaration that it would not express itself in the matter. Then the answers of three observatories, two academies, and three ministers said that they presented only the principal drifts of ideas. They do not do even that, because the observatories gave the views only of their three directors, and the academies those of their referees. And this was in general the tone in which the governments gave their utterances.

From the religious denominations, notably from those of Constantinople and Canterbury, came the answer that they were not opposed to a change in the ecclesiastical feasts, provided that uniformity was attained. Only the Jews objected to the blank day.

Two memoranda, however, were exceptions to the general tone. Their sense deserves to be expressed here explicitly.

The answer from London was that the government of His Majesty believes that it can in no wise co-operate in the proposal to fix the date of Easter by law, so long as this is not based on the consent of all Christian Churches, on the consent of at least the foremost of the civilized countries of the world, and on the endorsement of the industrial world. As regards the change in the calendar, the government of His Majesty fears that great difficulties will arise and it does not therefore consider it opportune to accept such proposals when they are not the expression of public opinion. For this reason His Majesty's government refrains from every expression of its mind, until after the Commission has thoroughly studied the question and is in a condition to recommend it.

The Vatican replied: It is with great satisfaction that the Holy See

takes cognisance of the express acknowledgment on the part of the League of Nations, that the reform of the calendar, and especially the fixation of the feast of Easter, is pre-eminently a religious question, and that any change whatever in this matter, although not bound up with dogmatic difficulties, would still tend as a consequence to break with well-grounded tradition, an act, which without weighty reasons of general interest, would be neither right nor desirable. Now the Holy See cannot find any reasons that are at all sufficient, for a change in the ecclesiastical custom of fixing the feasts, and notably the feast of Easter, a custom that has been transmitted to us by a venerable tradition and has had from remote times the sanction of Councils. Should it, however, be proved that a departure from these traditions is required for the public good, the Holy See would begin to approach the question, but this only after the previous decree of an Ecumenical Council.

With this the reform of the calendar is laid on the table for an indefinite time, but it is by no means rejected. It stands to reason that the usual method of fixing the date of Easter cannot be done away with without this decree of the Council. It is also evident that the calendar cannot be changed until after the Easter question has been definitely settled. On the other hand the bureaus of commerce, the banks, the educational associations, and in general the world of business and of trade will make every effort to furnish at the proper time the proof demanded by the Vatican.

If there is to be no other change in the calendar, the feast of Easter will probably be fixed upon the first Sunday in April, so that it will have a run of only one week or 7 days, from the 1st to the 7th of that month, instead of the five weeks or 35 days it now has from March 22 to April 25. If the days of the months are to be permanently connected with the days of the weeks, Easter may be placed upon the 1st of April, so that its date will not oscillate at all, but will remain perpetually the same, as most calendar reformers desire.*

THE TOTAL SOLAR ECLIPSE, 1926, JANUARY 14.†

By Z. A. and C. J. MERFIELD.

On Thursday, January 14, 1926, a Total Eclipse of the Sun will take place. The elements of this eclipse are given in Oppolzer's "Canon der Finsternisse" and numbered 7466. From these elements a knowledge of the center, the beginning and ending of the eclipse may be obtained. The tables are calculated well ahead and it must be remembered that they are in consequence only approximate. For a rigorous computation

*This article was received in February, but was crowded out by eclipse matter.

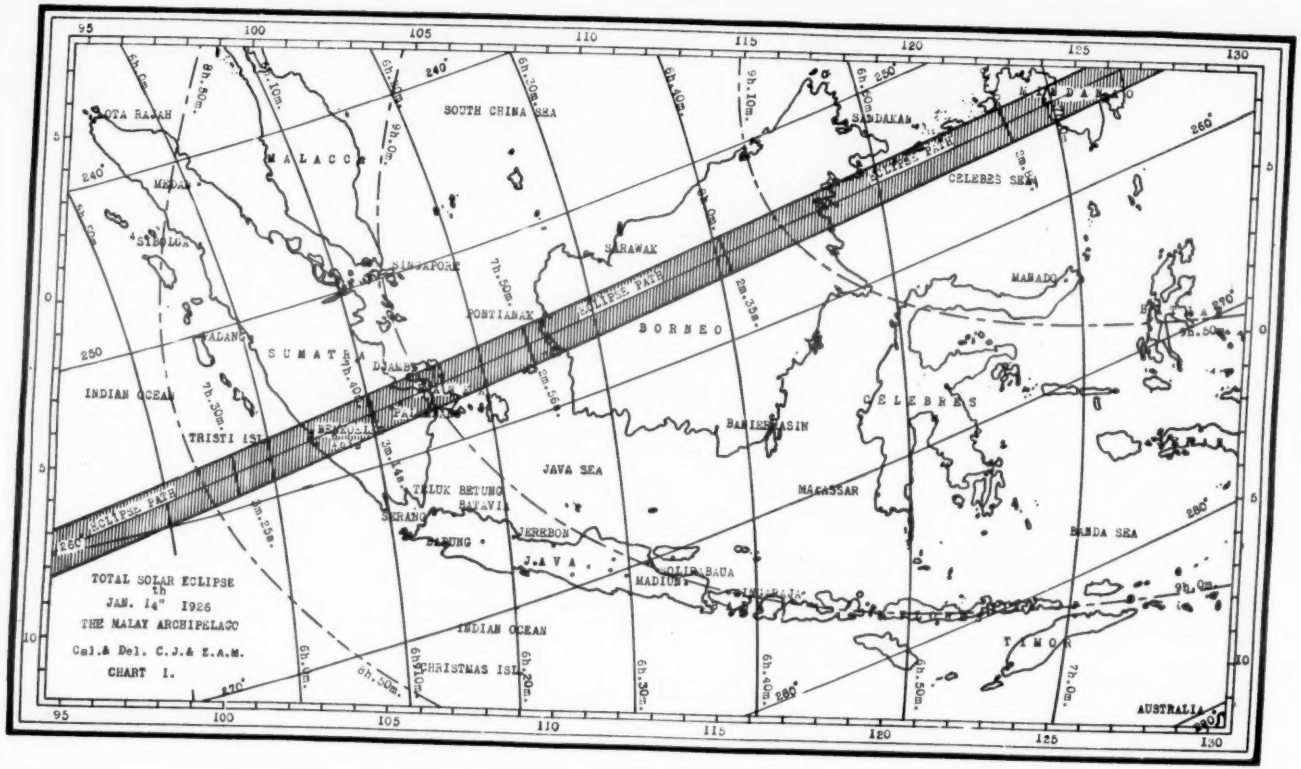
†A lecture delivered before The Royal Society of Victoria, June 18, 1925.

it is necessary to solve a more or less complicated system of equations, but much labor may be saved by the use of the so-called "Besselian Elements," which are tabulated in most National Ephemerides. These tables give the coördinates of the center of the moon's shadow and the radii of the umbra and penumbra on the fundamental plane, also the direction of the axis of the shadow with respect to the same plane. The Besselian Elements will be found convenient for many purposes, and have been used throughout our calculations. Unless otherwise stated, the times given are Greenwich, the first hour commencing at midnight, that is, midnight is either numbered 0 or 24.

For the earth generally, the eclipse begins at $3^h\ 59^m$ and ends at $9^h\ 14^m$. The Central Eclipse begins at $4^h\ 55^m$ in east longitude 21° 09′ and north latitude 6° 52′ and ends in east longitude 141° 58′ and north latitude 14° 28′ at $8^h\ 18^m$. The sun will be on the meridian at $6^h\ 38^m$ in east longitude 82° 45′, and south latitude 10° 05′. The axis of the umbra first touches the surface of the earth at a point 33° 47′ east and 3° 07′ north, that is, in Central Africa. After leaving the coast of Africa the center of the shadow moves east over the Indian Ocean and will not touch land again until about $7^h\ 35^m.8$, when it sweeps at a rate of 1388 miles per hour at a point approximately 102° 18′ east and 4° 0′ south, on the west coast of Sumatra. The locus of the center of the shadow will run approximately 15 miles south of Benkoelen, and the width of the zone of totality in that region will be about 89 miles. Thence the shadow passes with increasing velocity over Sumatra, Banka, Borneo and Mindanao, finally leaving the earth's surface at a point 129° 24′ east and 10° 44′ north.

Chart 1 has been prepared for the purpose of assisting those who desire to obtain, with reasonable accuracy, the times of the several contacts and other information, without rigorous computations for the particular localities in which they happen to be situated. The chart shows the locus of the shadow over the Netherlands East Indies, the outline of the advancing and receding edge of the moon's shadow every ten minutes of time, and also the position angle of the first point of contact. To illustrate the use of this chart, let us attempt to find the times of the beginning and ending of the partial eclipse which will be visible from Batavia. Upon examining this chart it will be found that Batavia lies between the $6^h\ 10^m$ and $6^h\ 20^m$ beginning lines, which are indicated in full lines; to be more exact it is 0.58 of the distance. Therefore we have to add $5^m.8$ to $6^h\ 10^m$ to obtain the instant of first contact, which gives us $6^h\ 15^m.8$. A rigorous computation actually gives $6^h\ 15^m.5$. Similarly, for the ending, Batavia lies 0.74 of the distance between the $8^h\ 50^m$ and $9^h\ 0^m$ ending lines, which are shown on the chart as broken lines. Thus we obtain $8^h\ 50^m + 7^m.4 = 8^h\ 57^m.4$ for the ending of the eclipse. Actually it should be $8^h\ 57^m.6$.

Lines have been drawn across the shadow path, which give the times of mid-eclipse, while the duration of the total phase is indicated on the chart near by. Suppose, for instance, that one desires to obtain the


TOTAL SOLAR ECLIPSE
th
JAN. 14 1926
THE MALAY ARCHIPELAGO
Col.& Del. C.J.& E.A.M.
CHART I.
ECLIPSE PATH
SOUTH CHINA SEA
CELEBES SEA
INDIAN OCEAN
JAVA SEA
BANDA SEA
MACASSAR
MALACCA
SUMATRA
BORNEO
CELEBES
JAVA
TIMOR
AUSTRALIA
SINGAPORE
PONTIANAK
SARAWAK
MANADO
BANJERMASIN
TRISTI ISL.
CHRISTMAS ISL.
SOLOMBAVA
MADURA
JERREBON
SERANG
BATAVIA
TELUK BETUNG
BENCOOLEN
PADANG
DJAMBI
SANDAKAN
95
100
105
110
115
120
125
130

time of mid-eclipse and duration of totality at Palembang, which is to all intents and purposes on the center line. Palembang is 0.11 of

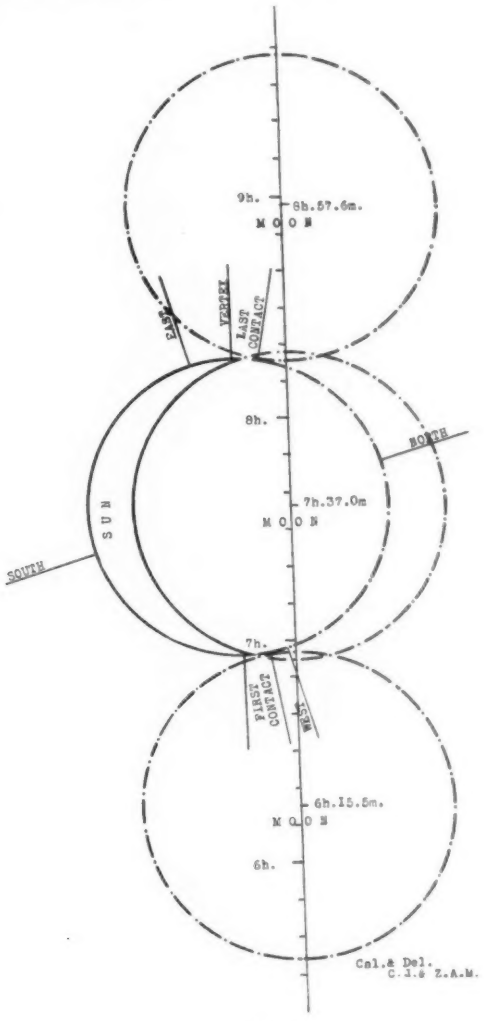


FIG. 1.

the distance between the $7^h\,40^m$ and $7^h\,50^m$ lines described above, and the time of mid-eclipse will therefore be $7^h\,41^m.1$. The duration will be $3^m\,14^s - 0.11$ ($3^m\,14^s - 2^m\,56^s$) which equals $3^m\,12^s$. Palembang

is, in fact, a little south of the center line, so, as we shall see later, the duration should be slightly less than this value; actually it is $3^m\ 7^s$.

If the place about which we desire information lies within the shadow zone but is not actually on the center line, then the duration of totality will be shortened.

The lines running across the outlines of the advancing edge of the moon's shadow give the position angle of the first point of contact, which is, of course, measured from north through east in anti-clockwise direction. For instance, at Padang, it will be seen that the first point of contact will occur at 251°.

For the more important places in the Archipelago the astronomical data have been rigorously computed and are given in Table I.

TABLE I.

Place	Longitude East of Greenwich	Latitude	Eclipse Begins — First Contact	Eclipse Begins — Position Angle	Eclipse Total — Second Contact	Eclipse Total — Position Angle	Eclipse Total — Third Contact	Eclipse Total — Position Angle	Duration	Eclipse Ends — Last Contact
	° ′ ″	° ′ ″	h m s	°	h m s	°	h m s	°	m s	h m s
Padang	100 20 30	— 0 58 1	6 0 18	251						8 54 12
Benkoelen	102 14 49	— 3 47 28	6 3 30	257	7 34 12	103.7	7 37 24	236.3	3 10	8 55 6
X	102 25 0	— 3 56 0	6 3 57	257	7 34 24	75.3	7 37 46	255.5	3 22	8 55 13
Palembang	104 45 34	— 2 59 26	6 11 30	257	7 39 54	92.9	7 43 0	267.4	3 7	8 58 24
Singapore	103 51 6	+ 1 17 11	6 12 30	249						8 59 24
Batavia	106 48 25	— 6 7 40	6 15 30	264						8 57 36
Pontianak	109 19 57	— 0 1 20	6 26 6	255	7 51 12		7 51 30		0 15	9 4 24
Macassar	119 24 6	— 5 8 9	6 47 24	271						9 4 36
Darwin	130 50 38	—12 27 45	7 4 36	279						8 51 18

X = The selected observing station.

Figure 1 illustrates the appearance of the phenomenon as it will be seen from Batavia. The moon is shown in three positions, namely, at $6^h\ 15^m.5$ when the eclipse will commence, at $7^h\ 37^m.0$ when the eclipse will reach a maximum, and again, at $8^h\ 57^m.6$ which marks the end of the eclipse. On the moon's path will be found a scale of time, and to obtain a picture of the eclipse at any instant, all that is necessary is to place the point of a compass on the scale at the time desired and then describe a circle of radius equal to that already drawn to represent the moon.

Sun's semi-diameter at mid-eclipse		975".6
Moon's " " "	$6^h\ 16^m5$	1016.3
" " " "	$7\ 37^m$	1012.5
" " " "	$8\ 57^m6$	1009.4

POSITION ANGLE.

1st Contact	2nd Contact	Vertex for time of mid-eclipse
263° 12′	67° 23′	73° 20′

ALTITUDE OF SUN.

$6^h\ 15^m5$	66° 22′
$8^h\ 57^m6$	31° 12′

MAGNITUDE OF ECLIPSE.

0.87.

Figure 2 gives the fiducial lines for observing stations on the center line in the vicinity of Benkoelen. They will be found helpful in setting spectrographs and other instruments.

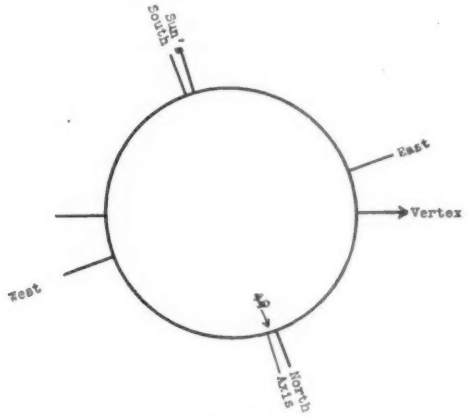


FIG. 2.

From an astronomical point of view it will be seen that the best position to make observations is about 15 miles south of Benkoelen, along the main automobile road to the village of Tais, where the duration of the total phase will be about $3^m\ 20^s$; but before entertaining such an idea we should consider the accessibility of this place and examine the all important climatological conditions which are to be expected along the path of the eclipse during the month of January.

The climatological conditions along the shadow path are more or less an unknown quantity, for the reason that the majority of the islands in the Netherlands East Indies are covered with primeval jungle, swamps and prairies of tall coarse grass, into which present day civilization has not penetrated to any great extent. The high mountain ranges traversing the various islands strongly affect the climate in various ways, and on this account a general description of the climatological conditions is difficult. The relative situation of the islands to the continents of Asia and Australia is perhaps the greatest factor in determining the climatic conditions found in them. Owing to the disposition of these large land masses, the northwest and southeast monsoon winds blow steadily during alternate seasons. These winds regulate the localization of the rainfall to a very large extent, and there are accordingly well marked wet and dry seasons. The average daily temperature on the coast is about 80° Fahrenheit and the night temperature about 70°; and it may be remarked that this state of affairs is extraordinarily equable. In general, the climate on the coast and in the lowlands is very damp, and the temperature sometimes, but very rarely, rises over 98°.5 F. In contrast, however, in some of the

mountain regions the temperature falls below freezing point, and there are some high peaks which are eternally covered with snow. With increase in altitude the temperature decreases about 0°.5 Centigrade for the first 300 feet; the function is not linear, the decrease being more rapid at greater heights. The only reliable information that can be immediately deduced from the publications and records of the *Koninklijk Magnetisch en Meteorologisch Observatorium te Batavia* is that almost daily tropical showers will invade even the best observing stations available. Other sources of information have been principally private enquiries and observations made through the courtesy of Dr. Braak. Many helpful data have been found in "The rainfall of the East Indian Archipelago, Vols. 1, onwards, 1879-1919"; "Wind, weather, currents, tides and tidal streams in the Indian Archipelago," by J. P. Van de Stok; "Climate of the Malay Archipelago" by the same author, which will be found in the reports of the International Meteorological Congress held in Chicago in 1893.

Statistical investigations of the data available show that the cloudiness of the sky is in no way associated with the rise and fall of the barometer. Cyclonic and anti-cyclonic conditions do not exist in the Archipelago. The formation of clouds during the rainy season increases as the day proceeds, and seems to be influenced by local land and sea breezes, also the monsoons and, to a very large extent, by the height and direction of the mountain chains. The monthly rainfall records alone give absolutely no evidence whatsoever as to the suitability of a locality for an observing station. A heavy rainfall does not indicate a continuously clouded sky, but, on the contrary, it may be remarked that the tropical showers appear to be local and are quickly followed by sunshine, and during the rainy season, October to February, in Sumatra, the atmosphere is extraordinarily clear. The Malay Archipelago is perhaps the most volcanic region in the world,—in Java alone there are about 120 well defined volcanic centers, nearly 50 volcanoes, of which 20 are active.

During the drier season, May to August, the upper air over the southern region of Sumatra is contaminated with volcanic dust and haze, which are borne along by the southeast monsoon on its way from the dry interior of Australia, and then the astronomical seeing is impaired. In this connection one will probably recall the famous eruption of the island volcano, Krakatao, in 1883. On this occasion the amount of volcanic material hurled into the upper atmosphere absorbed much of the ultra-violet light in the sun's rays and was responsible for the very remarkable sunsets witnessed in the tropics for several months following the eruption. From this aspect it will be seen that the month of January has something to commend it.

In what follows we will endeavor to restrict our attention to the conditions along the eclipse path, beginning at the west coast of Sumatra, and subsequently working eastwards.

At Benkoelen the clouds which form as a result of local conditions

along the coast, are either quickly condensed in the neighboring mountains, or else borne along sooner or later by the light sea breeze. The rainy season in Sumatra is from October to February, but as the prevailing wind is northwest, slightly more rain is condensed on the western side of the Barisan Mountains than on the east. Alternating clouded skies, rain and sunshine are to be expected. The chance of a clear sky at the critical moment is an even one, and certainly much better than for stations on the other side of the mountains.

It should have been pointed out before that Tristi Island, which lies off the west coast of Sumatra, is just within the zone of totality, and although the duration will be very short, it might prove to be a valuable station for some branches of spectroscopic work. The weather conditions there would, no doubt, be better than on the coast near Benkoelen.

So far as one can judge from data collected, inland stations are hardly worth considering. The monthly rainfall is about the same as elsewhere, but the rain falls less frequently, the hours of sunshine are less, and so the sky is likely to be overcast for correspondingly longer periods at a time, and thus the probability of favorably observing the eclipse is considerably lowered.

AVERAGE PERCENTAGE OF SUNSHINE.

Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Padang	65	65	69	71	76	69	72	73	57	64	57	61	67
Pontianak	47	58	59	62	62	68	69	63	53	54	56	57	59

PERCENTAGE OF SUNSHINE 8 A.M.—4 P. M.

Place	Dec. 1924	Jan 1925	Feb. 1925
Benkoelen	76	62	61
Palembang	48	56	51

It appears that the only readily accessible place on the other side of the mountains, and, of course, near the center line and as far west as possible, is Palembang, a large scattered town with a population of about 53,000 inhabitants. It is situated in the low lying interior of the southeast, about 54 miles from the coast, on the River Palembang (sometimes called Musi). Palembang is quite an important place on account of the activities of the Royal Dutch Petroleum Company and the Government Coal Mines. It is also the terminus of the main line of the South Sumatra Railway. This railway line runs right on to the wharves, and it is possible to load the trucks direct from ocean going steamers. The railway runs well into the highlands, but unfortunately all the villages it touches are well off the center line. There is also reliable motor transport service for passengers, mail and freight, which comes under the jurisdiction of the State Rail and Tramways. There are two splendid hotels at Palembang, "The Hotel Palembang" and "The Hotel Joling" and accommodation is easily obtained if due notice be given. Servants (jungus) for erecting the heavier parts of instruments and also bamboo shelters, could easily be secured. Building materials such as cement, bricks and timber can be obtained in any quantity.

We are led to believe, however, that the climate at Palembang is very debilitating, owing to the humidity and equable temperature, while the river vegetation and tropical jungle is infested with mosquitoes. The former would make preparations for observing the eclipse very trying, while the latter may menace the health of observers. Professor Ross* suggests sending a party to the vicinity of Palembang, but does not give any meteorological data or sufficient reason in support of his recommendation. Logically, Item 1 of his summary of the weather conditions, which our investigations fully confirm, namely, "that while at all stations the amount of cloud in the afternoon is greater than in the forenoon, the increase is less at the coast than at inland stations," indicates that it is not at all a good place. We find also that the duration of totality at Palembang is actually 8 seconds longer than the value given in the paper referred to above.

Penagen, a much smaller town, lies to the east of Palembang and is less inviting for the reason that it may be difficult to secure good accommodations, supplies and assistance.

Astronomical considerations do not warrant sending an expedition or observing party further east than the west coast of Borneo.

In the shadow path, between Sumatra and Borneo, lies Banka Island —area, 4,460 square miles. The population consists mainly of Malay stock, about 60,000, and Chinese about 50,000; the latter being chiefly engaged in mining operations.

The chances of a clear sky at the critical moment seem to be slightly higher at Banka than at Palembang, or on the west coast of Borneo. Suitable observing stations might possibly be found on Third Point, Nangka Island, or near a village to the south of Mondo Bay, in Banka Strait, or a little south of Rangkalpinang, on the east coast. An objection to these places is, however, the stormy conditions generally prevailing in January, due to the change of the northwest to the southeast monsoon. The Koninklijke Paketvaart Maatschappij steamers, and also others, ply between Batavia, Rangkalpinang, Belinju, Montoc, and the small village on the south of Mondo Bay, but to get to Third Point or Nangka Island seems to present some difficulty.

Observing stations on the west coast of Borneo are not recommended, as they are exposed to the changeable weather during January, which is accompanied by storms in the Karimata Strait.

Apart from the better opportunities, astronomical and otherwise, seemingly afforded on the west coast of Sumatra, we are led to believe that scientists visiting Benkoelen will be well received and given every assistance. One would find the people there most hospitable, and living would be made extraordinarily easy. There is an up-to-date Eastern Hostelry in Benkoelen, and it would not be a difficult matter to secure accommodation on arrival. At Benkoelen, cement, bricks and building materials can be obtained in reasonable quantities. Benkoelen is an important place on account of the Government gold and silver mines.

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There are good automobile roads in the vicinity, and it is easily possible to reach the center of the moon's shadow. It possesses a safe harbor and there is a frequent steamer service to and from Batavia, maintained by the Koninklijke Paketvaart Maatschappij.

Melbourne University, June 1, 1925.

THE TOTAL SOLAR ECLIPSE OF JANUARY 24, 1925.

Observations Made at East Chop Light Station, Martha's Vineyard, Mass.

By ELEANOR A. LAMSON.

With the intention of obtaining a photograph of the outer extensions of the corona during the solar eclipse of January 24, 1925, the Naval Observatory sent one of the 6-inch Dallmeyer portrait lenses, of 38-inch focal length, to Martha's Vineyard, Mass., in charge of Miss E. A. Lamson of the astronomical staff.

The time was limited, Miss Lamson being detained in Washington until January 20, and consequently a large amount of work had to be done after her arrival at the Eclipse Station in the short period of three days. Fortunately Prof. G. W. Rolfe, whose home is on the Island, rendered all possible assistance, and to him and to his wife the writer is most deeply indebted.

The lens in its brass tube, together with the necessary drawings for camera boxes, was sent to the Vineyard in care of Professor Rolfe. He received the lens January 17 and had the boxes made by the time Miss Lamson arrived on January 21. The camera was then completed and an equatorial mounting of pine timber to support it was constructed, with a fairly heavy portable base to give stability on the frozen, snow-covered ground. To hold the photographic plates an ingenious, hand-driven plate carriage, to be timed for following the sun by means of a metronome, was attached to the "eye" end of the camera box. This device was made at the Observatory, for the writer, from plans by and under the direction of Mr. C. B. Watts of the astronomical staff, and proved to be most satisfactory in action.

A preliminary photographic focal length of the lens was determined on the cloudy, blustering night of January 21 by exposing 5 by 7 Eastman Speedway plates on the distant lights across the Haven. Check plates were made the following night by star trails, pointing on Polaris and using double-coated Eastman D-C Ortho 5 by 7 plates.

Before leaving Washington, at the suggestion of Mr. G. W. Purdy, the Keeper of the Light Station at East Chop, it was decided to use the Light Reservation for the eclipse work, Mr. Purdy having obtained permission for this purpose from the District Superintendent of Lighthouses at Boston. This was a most happy decision since the latitude and longitude of the Light were available at Washington and conse-

quently the times of contact and duration of totality could be computed in advance.

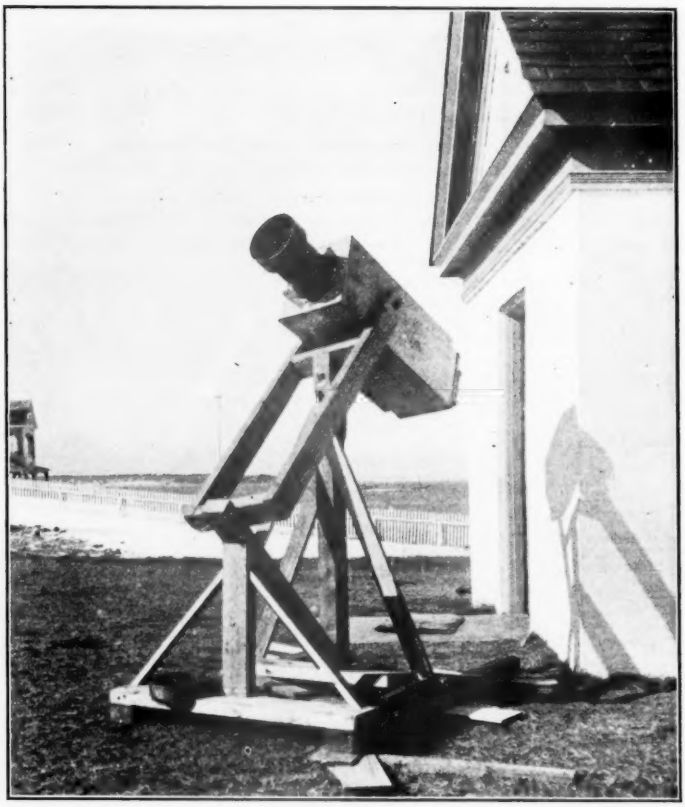


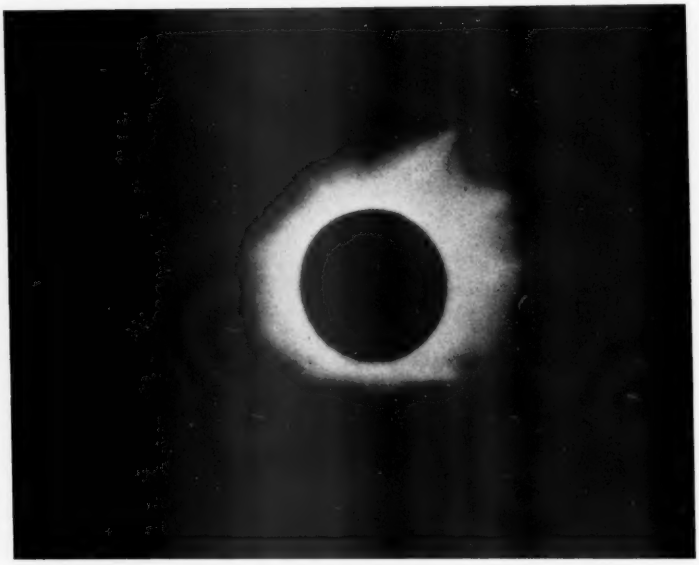
Fig. 1.—The camera and mounting as used during the Total Solar Eclipse of January 24, 1925. East Chop Light Station, Martha's Vineyard, Mass.

Upon visiting the reservation a satisfactory site for the camera was found on the high bluff 122 feet E by N ½ N from the center of the light tower and near the small, white brick oil-house which would serve as a wind break. The coördinates of the light tower as given by the Coast and Geodetic Survey are as follows:

Latitude = +41° 28′ 13″.139
Longitude = 70° 34′ 4″.573 West from Greenwich.

Near the camera and also sheltered from the wind by the wall of the oil-house a location was found for the 2¼-inch Tolles telescope, the

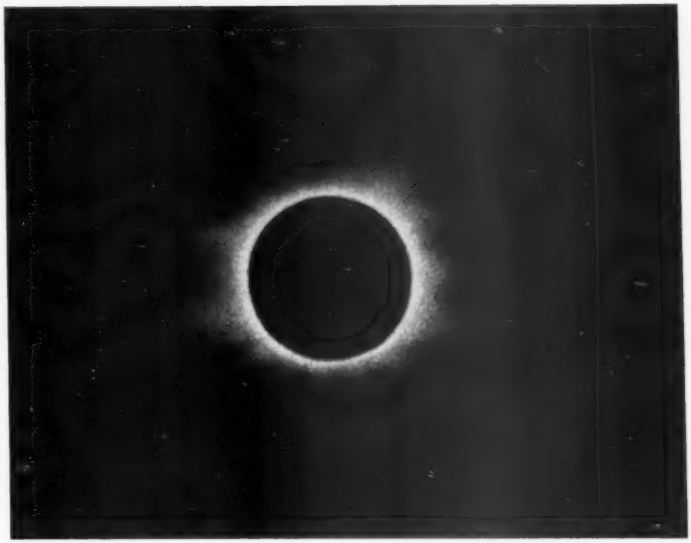
PLATE XXVIII.



TOTAL SOLAR ECLIPSE OF JANUARY 24, 1925.

The Corona as photographed with the 38-inch camera, 6-inch Dallmeyer portrait lens, at East Chop Light Station, Martha's Vineyard, Mass.
Negative 1, 25 seconds exposure.

PLATE XXIX.



TOTAL SOLAR ECLIPSE OF JANUARY 24, 1925.

The Corona as drawn by L. E. Jewell from the negatives obtained with the 38-inch camera, 6-inch Dallmeyer portrait lens, at East Chop Light Station, Martha's Vineyard, Mass.

property of Mr. Rolfe, with which the times of contact were to be observed.

On January 23 the apparatus was taken to the Light Station and the camera adjusted in position on the site selected the preceding day. Fortunately, though cold and a northwest gale blowing, the day was fair so that it was possible to have a practice drill as to the procedure to be followed during the eclipse period. As stated above, the mounting of the camera was equatorial in character with sufficient play so that the lens could be easily pointed on the sun and then firmly clamped. Since exposures of several seconds duration were to be made, the following of the solar image by means of the hand driven plate-carriage had to be timed very carefully.

Mr. Rolfe was detailed to assist Miss Lamson in the work with the camera. Mr. Purdy, assisted by his son and Mrs. Rolfe, was to observe the times of contacts with the 2¼-inch Tolles. All members of the party were to look for shadow bands, note the Baily Beads and other attending phenomena. For making sketches of the corona several sheets of paper with circles of about 2 inches in diameter were prepared.

Eclipse day dawned gloriously fair and cold. By 7:30 A. M. the enthusiastic members of the party had assembled at the Lighthouse reservation and the final preparations for the great event were made. The big camera was carefully adjusted and firmly fixed in position. Within the open doorway of the oil-house nearby were placed the metronome, to be used in timing the motion of the crank-driven plate carriage, and the plate holders, the latter having been loaded the preceding night with the D-C Ortho plates. About 10 feet to the left of the observer at the plate-end of the camera the Tolles telescope, provided with sun-shield and shade glass, was set up. The timepieces to be used were near at hand, *i. e.*, a U. S. L. H. S. stop watch and a Waltham watch belonging to Mr. Purdy. Mr. Rolfe obtained his watch correction by comparison with the Naval Observatory time signal sent out at 8:40 A. M., Eastern Standard Time, and received via KDKA on the Light Station radio set. Consequently, his watch was used as the standard timepiece of the Eclipse Station and with it the other timepieces were compared.

Close to the predicted time of first contact, 8:03 A. M., the dark limb of the moon was seen cutting slowly into the bright disk of the sun. Gradually as the moon moved upon the sun's face the daylight diminished and the landscape took on a weird, greenish yellow appearance, while the sea became quite dark. About two minutes before totality the flickering shadow bands were noticed moving in general from east to west, the wave front being north and south. When first observed they were quite faint, but as totality approached they became much stronger showing with great distinctness on the snow patches on the ground and rippling up the white walls of the oil-house.

Meanwhile the gradually disappearing sun had been watched and

followed by the astronomers at the telescope and camera. Suddenly the thin bright crescent of the sun seemed to break up into a string of brilliant dots, known as the Baily Beads, and a moment later the corona flashed out in all its beauty. Mr. Purdy at the Tolles called "Time" and the work at the 6-inch camera was started. Two exposures were made, the first of 25 seconds duration, the second of 11 seconds. A third plate was being inserted in the plate carriage when a brilliant flash of sunlight appeared from behind the dark limb of the moon and totality was over.

Immediately after carefully packing the plate holders with their precious contents, the members of the eclipse party assembled in the hospitable home of the Keeper to warm up and to discuss the thrilling events of the morning. Beside the two exposures with the 6-inch camera, the times of second and third contacts had been observed. (Later with Mrs. Rolfe's assistance Mr. Purdy observed the fourth.) The data were reduced at once, using the original records, comparison as to watch times being made with Mr. Rolfe's watch as standard. The results of the contact observations follow:

Contacts	Eastern Standard Time (watch)	Watch corr.	Corrected Eastern Standard Time Observed	Computed	O—C
	h m s	s	h m s	h m s	s
II	9 14 48	+59	9 15 47	9 15 41	+6
III	9 15 59	+59	9 16 58	9 16 58	0
IV	10 34 57	+59	10 35 56	10 36 07	−11

The onrushing shadow of the moon had not been seen, which may possibly have been due to the extreme clearness of the atmosphere. The shadow bands before totality had been observed by several members of the party and all were greatly impressed with the vivid, rippling, wave-like effect. Mrs. Purdy and Mr. Randolph had made sketches of the corona. The glory of the corona was startling. The inner corona close to the moon's limb was of a bright rose colored hue, about as brilliant as the prominences as seen by the writer in the 1923 eclipse in California. The outer extensions of the corona were pearly in appearance and softly blended with the skylight. The planets Venus, Mercury and Jupiter were seen during totality, as was also the star α Aquilae. A band of buffy yellow of about 15 degrees width stretched around the horizon during totality and one of the party remarked that it looked like a winter strip sunset.

After the fourth contact had been observed the instruments were dismounted and that night the eclipse plates were developed by Mr. P. C. Mosher, a photographer of Vineyard Haven, under the immediate supervision of the writer. Both negatives show a large amount of fine detail, particularly the one of 25 seconds exposure, but each is marred by a faint secondary image, for which so far no satisfactory explanation has been obtained. It has been suggested that these extra images, which appear on both negatives in the same relative position, may be halation effects as a result of failure in backing the plates, or that they

may be due to some shift in the plate-carriage or in the equatorial mounting during the exposures, or possibly that they may be "ghosts" in the lens system itself.

Upon the return of the writer to Washington, the negatives were sent to Mr. C. W. Frederick, of the Research Laboratory of the Hawk Eye Works at Rochester, N. Y., for examination and for suggestions as to the possibility of disentangling the double images. He most kindly undertook the solution of the problem, the result being the photographs of the corona, Plates XXVIII and XXIX.

Mr. Frederick reports that from the negative of 25 seconds exposure an enlargement was made, which was retouched by an artist connected with the Eastman Kodak Company, spotting out the secondary image, see Plate XXVIII. He then tried another scheme, turning the negatives over to Mr. L. E. Jewell who projected teh images from the negatives on a screen and made sketches of what he saw, separating the images. After making the best possible composite drawing, using the two negatives in the process, he photographed his drawing, see Plate XXIX.

To Mr. Frederick who was at one time a member of the astronomical staff of the Naval Observatory, and to Mr. Jewell who has been associated with a number of the Observatory Eclipse Expeditions, the writer wishes to express her appreciation both for their interest and for their work, resulting in the beautiful coronal photographs herein published.

U. S. Naval Observatory, Washington, D. C.

THE GOOD INSTRUMENT MAKER.*

By ALMER PENNEWELL.

My father was a mechanic. Naturally, therefore, I respect the man who can use tools and especially the man who can use them with skill. I have come to regard tools as sacred. Anything, indeed, which adds to the welfare and happiness of mankind is sacred, whether it be a plow turning over the soil, a telescope searching the lonely places of the universe, or a stethoscope measuring the throbbing of human life.

In speaking of the instrument maker, I have in mind not the scientific discoverer, such as Faraday; not the inventor, such as Edison; not the great manufacturing concern, such as the General Electric Company, but the right-hand man of every scientific investigator, the quiet, unobtrusive, effective mechanician; the man who comes (not in the

*From remarks made by the Reverend Almer Pennewell on June 29, 1925, at the funeral of Frederick Küng, who for seventeen years was the Instrument Maker in the Laboratory of Physics at Northwestern University. During this period Mr. Küng made many excellent instruments of precision for the laboratory and the Dearborn Observatory.

whirlwind or thunder, but comes) observing the sacrament of silence.

Among the earliest benefactors of the race must be reckoned the man who first sharpened a stick; for such a stick became at once a means of procuring food, an instrument of defense, and a tool to help in making other tools. The fairly well connected history of Egyptian civilization which we now possess, shows that the earliest of all machines were the drill, the thrust drill, and the potter's wheel. With these simple means nearly everything was made that *was* made in those distant days. But the role of the instrument maker today is hardly less important than then.

The passing of Mr. Küng forcibly calls to our attention the characteristics and services of the instrument maker. I take these to be somewhat as follows:

(a) First of all his work is preceded by a long period of preparation. Here he makes a first-hand acquaintance with the properties of matter, an acquaintance which many a man of science would be proud to possess. Here he learns what is possible and practicable with any given material. Here he learns not only the care of tools, but also how to make new tools as occasion demands. Mr. Küng served an apprenticeship in three of the best shops of Europe, first in Munich, then in Berlin, later with Leybold of Cologne, and last of all with Gaertner in Chicago.

(b) A second characteristic of the instrument maker is his accuracy. The demands of modern science are extremely exacting. The astronomer wants not only the most perfect optical glass but wants it ground and polished to perfect surfaces. The physicist demands a screw in which the errors are so small that they can be detected only with the utmost difficulty. He wants the most delicate suspensions for galvanometer and radiometer, perfectly centered circles, the most accurate balances. These attainments in the laboratory are increasingly reflected in engineering practice.

My respected teacher, Dr. Charles J. Little, used to say that "accuracy is the first step in morality and truthfulness." The work which comes out of a man's shop tells you much about his character. A mortise, a bearing, a finished surface is a measure of morality.

(c) The next characteristic which impresses me in the good instrument maker is his unselfish devotion to the task of producing exactly what the other man needs. The final *purpose* of the investigator does not here come into question, but the design of his apparatus, its material and its dimensions are constantly open to the mechanician for suggestion. If only some of our fine optical and electrical instruments could tell their own stories, we might be amazed to learn how many of their excellent features were suggested by the man at the bench.

(d) Lastly the good instrument maker has a proud sense of responsibility. He has the artist's pride that the piece which leaves his hands, and which in many cases is to be used for years to come, will awaken in the user a sense of satisfaction and gratification. How many an

unconscious compliment is paid to the unknown but skilled watchmaker by the wearer of the watch, who puts implicit reliance in the accuracy of his time piece. Students by the hundred paid just such a compliment to Mr. Küng in their confidence in the University clock and bell system which were under his regulation.

The name of the instrument maker does not often appear on the list of faculty and officers of the university. It is only now and then that a published research makes a gracious acknowledgment of assistance received from the mechanician. But I remember the peculiar thrill when first I read the list of important men given in the early chapters of Genesis, to find among them "Tubal-Cain, an artificer of instruments of brass and iron." The writers of these ancient records were men of historic and poetic sense. No list of the world's important men is complete without the instrument makers. The glory of the tabernacle would have been impossible without them.

We are gathered here today to pay honor to Mr. Küng, an artificer, who in his Christian character, in his skill, industry, and devotion, fulfilled and exemplified these high characteristics of the good mechanic.

THE ECLIPSE EXPEDITION FROM THE AMHERST COLLEGE OBSERVATORY.

By WARREN K. GREEN.

The program adopted by the Amherst College Observatory for observing the eclipse of 1925 January 24 was in direct contrast to those which have been adopted for observing other eclipses during the last thirty years by this observatory. For the previous eclipses much elaborate and intricate apparatus was constructed and transported, at great expenditure of time and money, to distant eclipse stations. This year the only pieces of apparatus employed were a few field glasses, several small cameras, several transmission gratings, three stop watches and about five hundred pieces of "fogged film."

A special train transported the observing party from Amherst to the eclipse station. About five hundred persons took the trip, including about four hundred students and faculty members from Amherst College and the Massachusetts Agricultural College, and about one hundred townspeople from Amherst. Since the train departed at six o'clock in the morning with the temperature about ten degrees below zero, it is obvious that those who took the trip were not merely the idly curious. The station selected for our observations was close to a siding about half way between the Wallingford and North Haven, Connecticut, stations on the Springfield to New York Division of the New York, New Haven and Hartford railroad. A large field is located just west of the right of way of the railroad, which afforded ample opportunity for the

party to scatter about. The approximate coördinates of the observing station, as taken from the maps of the Coast and Geodetic Survey, are: Latitude = 41° 24′ 30″ north and Longitude from Greenwich = 72° 52′ 00″ west.

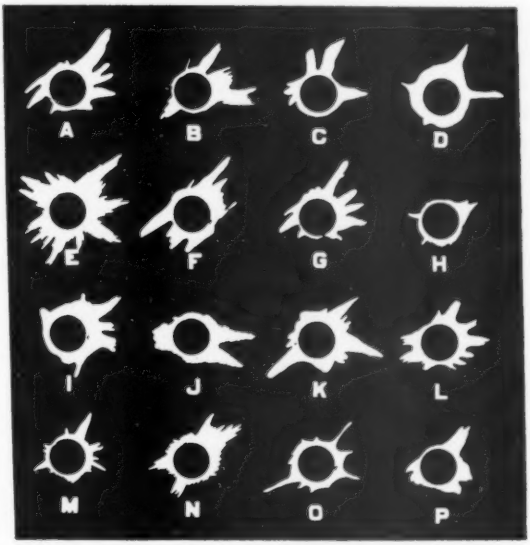
The members of the party had previously been instructed as to the methods for observing the various phenomena to be expected, and were provided with printed folders similar to those used by the Mt. Holyoke and Smith College expeditions to Windsor, Connecticut. These folders contained a number of questions relative to the various phenomena, and carried a circle approximately three centimeters in diameter to serve as a basis for making sketches of the corona. About one hundred members of the party returned these folders with the questions answered and with drawings of the corona. It is from these folders that the following notes have been prepared.

Much has been said in previous reports from various observers concerning the weather on eclipse day. At Amherst the sky was perfectly clear at five o'clock in the morning. By the time for the departure of the train the dawn had begun to appear, and with it came a heavy bank of clouds. These clouds gradually overspread the sky until by seven o'clock it was completely overcast. From this time on the clouds gradually scattered and first contact was observed from the moving train through a fortunate break in the "mackerel sky." The train arrived at the eclipse station about thirty minutes before totality and we found the sky about two-thirds covered with alto-stratus clouds. The clouds continued to disperse and during totality the sky was absolutely clear except close to the horizon. Immediately after totality had passed the clouds began to reform, and within thirty minutes the sky was again completely overcast

Prior to totality shadow bands were observed by nearly every member of the party. Since the special train stood on a siding about three hundred yards from the majority of the observers and between them and the direction of the sun, it seems very probable that "shadow bands," observed fifteen minutes before totality by some of the observers, were due to heat rising from the train. A great many, however, undoubtedly saw the true bands. These were observed from about two minutes prior to totality and were generally described as faint pencil lines moving rapidly and in an indeterminate fashion across the snow. The average width was reported as about two centimeters and the distance between bands about fifteen centimeters. The general direction of motion seems to have been from southwest to northeast. Due to the transitory character of the bands, most observers found it very difficult to estimate the speed, but the consensus of opinion is about fifty centimeters per second. A number of the members of the party watched for the approach of the shadow of the moon across the snow. Only one observer, however, reports himself as certain of seeing the approaching shadow. Since he reports it as coming from the direction diametrically opposite to that from which the shadow should have

come, his observations seem hardly reliable. Just prior to totality several members of the party, who were equipped with small transmission gratings, watched for the flash spectrum and all were successful in observing it. The observations were entirely qualitative and contain mention of a strong yellow line (probably D_3), and the characteristic line in the green.

Reports on the meteorological changes that took place during totality are very confusing. This is undoubtedly due to the fact that no instruments were employed, and the fact that the relatively slight changes in temperature would not appreciably modify the discomfort produced by a temperature of three degrees below zero. There was very little, if any, wind, but several observers reported a distinct change in the direction of drift of the smoke from one of the locomotives. Several commented upon the gorgeous coloring of the horizon, particularly in the northwesterly quadrant.



SKETCHES OF SOLAR CORONA, JANUARY 24, 1925.

The drawings obtained of the corona make a very interesting study, perhaps of more interest to the psychologist than to the astronomer. The accompanying cut shows a number of the sketches obtained. These are all oriented in a corresponding manner on the plate, the orientation factor being obtained from the position of the group of three planets, which is shown on all of the originals. With the exception of observers J and K, the most prominent feature was the long streamer in the northwesterly quadrant. Practically all of the observ-

ers commented upon this streamer as the most striking phenomenon of the eclipse. The consensus of opinion was that the color of the inner corona was distinctly yellowish, with the yellow tinge fading out with distance from the sun. The outer corona was usually reported as "blue white." Several recorded prominences and described their color as "rose red," "scarlet," or "ruddy." The location of the prominence most generally observed is shown in sketches F, I and O on the plate. None were able to give a description of the shape of the prominence, probably because it was too small to be clearly seen without instrumental aid. The intensity of the coronal light was sufficient to render it visible for several seconds after totality had passed.

The tint of the sky during totality was variously described as "deep purple" or "blue green." In intensity of illumination it was recorded as about equal to that of late twilight. Practically all observers noted the three planets to the west of the sun and several commented upon the appearance of Saturn in the southwest. The number of stars seen varied with different observers from three to seven. Venus was observed by one student for fourteen minutes after totality when it was lost in a cloud. The other planets and the stars faded out within five minutes after the end of totality.

Very few of the observers were able to describe the quality or intensity of the general illumination of the landscape during totality. This is probably because the quality was so different from anything that they had previously observed that they were unable to make comparisons. Nearly all of them, however, reported it as different in quality from moonlight. One careful observer reported that "prismatic reflection from snow crystals was entirely in the blue and green regions, with a peculiar absence of red and yellow light." Several others reported that the snow had a distinctly bluish tinge. The intensity of the general illumination was sufficient to permit the easy reading of the type on the printed folders. This type had been read with difficulty on the bright moonlight nights two weeks prior to the eclipse. Watch faces could be read with ease during totality.

No attempt was made to determine accurately the instants of the various contacts. The first and last contacts were observed from the moving train and any observations would have been valueless because of lack of knowledge of the observing points. The second and third contacts were observed at a well determined location, but, due to the extremely low temperatures, it is not felt that watch rates can be relied upon with an accuracy sufficient to render the observations of much value. Eight careful determinations were made of the duration of totality. Three of these were made with stop watches in the hands of experienced timers, and the other five determinations were made with ordinary watches in the hands of observers of varying experience. From the eight observations the weighted mean value of the duration of totality, in latitude 41° 21′ 30″ north and longitude 72° 52′ 00″ west, is 120.8 ± 0.41 seconds. In forming this mean value the stop watch

PLATE XXX.

THIRTY-FOURTH MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY, NORTHFIELD, SEPTEMBER, 1925.

Key to Plate XXX.

1. Darling
2. Tatlock
3. Struve
4. Hamilton
5. Campbell
6. Phillips
7. Beal
8. Bobrovnikoff
9. Fecker
10. Stebbins
11. Mrs. Lee
12. Wylie
13. Elvey
14. Miss Farnsworth
15. Comstock
16. Robert Stebbins
17. Urie
18. Mrs. Bennett
19. Miss Hawkes
20. VanBiesbroeck
21. Miss Jessica Young
22. Pawling
23. Wilson
24. Miss Haumueller
25. St. John
26. Miss Anne Young
27. Huffer
28. Bennett
29. Lee
30. Gingrich
31. Henry Jewell
32. Jewell
33. Stokley
34. Fath
35. Miss Elizabeth Young

determinations were given weight ten and the ordinary watch determinations were given weights varying from three to unity depending upon the experience of the observer.

A number of members of the party took photographs with small cameras during all phases of the eclipse. Most of the photographs are on too small a scale to be of any scientific value, but serve admirably as souvenirs of the trip. A professional photographer, using a camera of twenty-two inches focal length, obtained a number of very interesting photographs during totality. A number of very peculiar effects were obtained on group pictures taken during the partial phases. Nearly all of these can be traced to abnormal reflections produced on the various surfaces of the lenses, due to the fact that in most cases the camera was pointed nearly in the direction of the sun.

Amherst College Observatory,
Amherst, Massachusetts, 1925, May 15.

THIRTY-FOURTH MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY.

On the invitation of Professor H. C. Wilson, the thirty-fourth meeting of the Society was held from September 8 to 10 at Goodsell Observatory of Carleton College, Northfield, Minnesota. Despite the scale of distances in the Mississippi Valley, many if not most of the members traveled by automobile, and all cars managed to arrive at Northfield under their own power. The local arrangements were ideal, the men's dormitory of the college being thrown open to the visitors, who thus had the pleasures of a large house party between the sessions.

The opening event was an evening reception at the home of President and Mrs. Cowling of Carleton College, who gave the astronomers opportunity to meet members of the faculty families and others of the city.

In the absence of the president and vice-presidents of the Society, the sessions were presided over by Messrs. Comstock, St. John, and Wilson, and Miss Anne S. Young. The meetings were held in Laird Hall, with frequent visits to the nearby Goodsell Observatory, the home of POPULAR ASTRONOMY.

After morning and afternoon sessions on Wednesday, the visitors were taken for a ride in and about Northfield. In the evening they reassembled for non-technical accounts by those who had attended the meetings of the International Research Council at Brussels and the International Astronomical Union at Cambridge. These reports were followed by a reunion meeting of the ill-fated California eclipse of 1923, many of those who had been at Catalina seeing themselves again in the motion pictures furnished by the Yerkes Observatory.

The reading of papers was finished by noon of Thursday, so different forms of diversion were furnished for various tastes, including an organ recital, a round of golf, a plunge in the lake near the Observatory, and a tea for the ladies. The attendance held true until the final dinner, at which about forty persons were present.

The meeting was marked by the first real contest in the election of officers since the introduction of the scheme of nominations by a committee. Several members had proposed an opposition ticket, and although the official nominees were all elected, the showing of the irregulars was good enough to encourage their supporters to make a similar attempt in the future. The officers chosen, including those serving unexpired terms, are as follows:

President	George C. Comstock	1925-1928
Vice-Presidents	Heber D. Curtis	1924-1926
	S. A. Mitchell	1925-1927
Secretary	Joel Stebbins	1925-1926
Treasurer	Benjamin Boss	1925-1926
Councilors	Anne S. Young	1923-1926
	C. A. Chant	1924-1926
	W. J. Hussey	1924-1927
	Harlow Shapley	1924-1927
	H. C. Wilson	1925-1928
	W. H. Wright	1925-1928
Ex-Presidents	W. W. Campbell	
	Frank Schlesinger	

Members of the Division of Physical Sciences, National Research Council:

Ernest W. Brown	1923-1926
Harlow Shapley	1924-1927
Joel Stebbins	1925-1928
C. G. Abbot	1926-1929

The following persons were elected to membership, making a total of four hundred and twenty-one in the Society.

H. Y. Benedict, University of Texas, Austin, Texas.
Gerrit J. Bennett, Waterloo, Iowa.
Maude Bennot, Dearborn Observatory, Evanston, Illinois.
Nicholas Bobrovnikoff, Yerkes Observatory, Williams Bay, Wisconsin.
Ernest Clare Bower, U. S. Naval Observatory, Washington, D. C.
Mary E. Byrd, R. R. 9, Lawrence, Kansas.
J. W. Fecker, 5606 Euclid Ave., Cleveland, Ohio.
David E. Hadden, Alta, Iowa.
Ralph C. Huffer, Beloit College, Beloit, Wis.
Lewis H. Humason, Mount Wilson Observatory, Pasadena, California.
J. L. Justin, Yerkes Observatory, Williams Bay, Wisconsin.
Frances Lowater, Wellesley College, Wellesley, Massachusetts.
Elizabeth McCormack, Mount Wilson Observatory, Pasadena, California.
Elizabeth H. Morrison, 250 Ravine Drive, Highland Park, Illinois.
Walter C. Myers, U. S. Naval Observatory, Washington, D. C.
Harvia H. Wilson, 206 S. Third St., Fulton, N. Y.

Members of the Society present at the Northfield meeting were

W. O. Beal	Alice H. Farnsworth	O. J. Lee
G. J. Bennett	E. A. Fath	J. Pawling
N. Bobrovnikoff	J. W. Fecker	E. C. Phillips
J. W. Campbell	C. H. Gingrich	C. E. St. John
G. C. Comstock	W. M. Hamilton	J. Stebbins
J. H. Darling	C. M. Huffer	J. Stokley
C. T. Elvey	W. R. Jewell	O. Struve

J. Tatlock
F. D. Urie
G. Van Biesbroeck
H. C. Wilson
C. C. Wylie
Anne S. Young
Jessica M. Young

The time and place of the next meeting were not determined by the Council, but will be announced later.

ABSTRACTS OF PAPERS

WAVE-LENGTHS IN β CEPHEI WITH DISPERSIONS OF TWO AND THREE PRISMS.

By Sebastian Albrecht.

The use of lower dispersion than that of three prisms for Class B stars may be desirable either on account of diminishing brightness as we go down to fainter stars or because of great width and general diffuseness of the spectrum lines. A comparison of results obtained with different dispersions is therefore very much desired. In the present instance wave-lengths were determined from measures of 21 three-prism and 108 two-prism spectrograms of β Cephei, Class B1, which were kindly placed at my disposal by Professor Frost. The observed wave-lengths are based on a common set of normal wave-lengths. For such of the lines as have a considerable number of observations with each dispersion the agreement is quite satisfactory, especially in view of the poor quality of many of the lines. In a systematic sense the wave-lengths seem to diverge very slightly in both directions from 4460. In the table a column has been added for types B0 to B8.

As β Cephei has a variable radial velocity with a period of only 0.19 day, several sets of plates each covering a complete period or more had been obtained with the dispersion of two prisms. The observed wave-lengths show no definite variation which would be synchronous with the variation of the radial velocity of the star.

β Cephei				B0 to B8	
II-Prisms		III-Prisms		III-Prisms	
λ (Rowland)	P. E.	λ	P. E.	λ	P. E.
4340.609	±.013	.582	±.018	.638	±.004
49.633	.012	.565	.014	.574	.008
51.493	.015	.491	.018	.478	.012
67.046	.013	.020	.012	.032	.007
88.107	.007	.092	.010	.104	.003
4415.062	.006	.054	.008	.064	.004
17.154	.009	.142	.010	.140	.005
37.797	.029	.719	.021	.726	.005
71.687	.005	.711	.008	.696	.002
81.403	.009	.388	.011	.395	.002
4552.787	.005	.784	.007	.783	.004
68.003	.007	.032	.009	.995	.004
74.888	.011	.940	.009	.929	.005
91.092	.007	.115	.010	.119	.007
4596.316	.016	.351	.017	.351	.009
4713.319	.016	.466	.04-	.353	.010

WAVE-LENGTHS OF THREE SILICON LINES IN STELLAR SPECTRA.

By Sebastian Albrecht.

The difficulties encountered with the spectra of silicon in the laboratory enhance the importance of a study of the wave-lengths in stellar spectra. From additional measures sent by Professor Frost, the stellar wave-lengths previously determined were considerably strengthened. The wave-lengths observed in stars agree more closely with the earlier wave-lengths determined in Fowler's laboratory and published by Barrell in 1923 than with those published by Fowler in 1925, as is shown in the following table (on the I. A. system):

Fowler	Barrell		Albrecht (In Stars)			
1925	1923		B0 to B8		β Cephei, II-Prisms	
λ	λ	P. E.	λ	P. E.	λ	P. E.
4552.654	.611	$\pm$.002	.612	$\pm$.004	.616	$\pm$.005
4567.872	.824	.002	.823	.004	.831	.007
4574.777	.737	.002	.756	.005	.715	.011

ABSTRACT OF RESULTS OF APPLICATION OF SCHUSTER'S PERIODOGRAM TO LONG RAINFALL RECORDS.

By Dinsmore Alter.

The Pacific Coast of the United States, Eastern United States, Northern Europe and the Punjab in India have each been examined by means of the periodogram. The results for periods longer than nine years were published a year ago in the *Monthly Weather Review*.

The results for all four sections have been very satisfactory. All except the Eastern United States have given *surprisingly* good results. It would take too long to show all these; therefore, the Punjab, which is no better than two of the other sections, will be presented as a sample.

In this section there are three periods with amplitudes large enough to challenge attention as possible real periods. The periodogram calculation has no connection in any way with sun-spots. Sixty-two years of data were used, which is not at all commensurable with the sun-spot period. There has been no adjustment of data nor smoothing. Yet we find that these three peaks come exactly at one-third, one-seventh and one-eighth the sun-spot period of twenty-two and a quarter years, as determined by the Mount Wilson magnetic polarity observations. There is no approximation. The agreement is exact. Apart from the probability of reality being large from magnitudes alone, we have thus an almost incontrovertible evidence of the reality of a connection between the two phenomena. Other considerations, however, prove that the spots do not themselves influence the rainfall. The connection is of the second order. The complete results for all sections will soon be published in the *Monthly Weather Review*.

PROPER MOTIONS OF FORTY STARS.

By Maude Bennot.

The table shown by lantern slides gave the results of the determination of proper motions of forty stars. These have been found by least-squares solutions of all available micrometric measures of them. In some cases the present values are the first which have been found. In others, as for **4233** β Geminorum and **8798** Σ 2398, the character of the motion is well known. In any case the results may be of interest for comparison with meridian circle values as they are or may become available. The star **9916** is of especial interest, for here is the rare case of a faint companion (11.0) with considerable motion.

STUDIES OF SPECTRUM VARIABLES OF CLASS Be.

By Ralph H. Curtiss.

A considerable proportion of the stars whose spectra are of Class B with emission lines are spectrum variables of the type exemplified by ϕ Persei. It is notable that out of seventeen stars with double Hβ or Hγ emission, for which considerable lists of spectrograms are available at Ann Arbor, eleven have proved to be ϕ Persei variables. It is safe to say that this type of variation is a prevailing attribute of stars with Class Be spectra.

The prominent variation in spectra of this group is a change in the strength, and more particularly usually in the relative strength, of the two components of the hydrogen emission lines. The curves of variation of the ratios of the intensities of the two components of separate hydrogen lines has been well determined at Ann Arbor for H. D. 20336, 25 Orionis, κ Draconis, b^2 Cygni, and ν Cygni. In different stars these curves are of different forms with no prevailing type. For different lines of the same star the emission ratio curves are of similar form but the range of variation increases with wave-length. The variation appears to be greater for stronger lines, at least in any given star, and thus probably increases with the altitude at which the line originates. Absorption and metallic emission lines are also subject to variation.

The periods of ϕ Persei variables are long. ϕ Persei and ν Sagittarii may be exceptions with their relatively short periods of 126.8 and 138 days. The other known periods, of which the writer has record of eleven, are of several years at least and reach an uncertain maximum at fifteen years. Accepting these spectrum variables as velocity variables the stars with spectra in Classes Oe5 to B9 inclusive may be divided into four groups—the first with periods less than fifteen days, the second from 20 to 50 days, the third with periods from 100 to 150 days, and the fourth with periods from 3.75 to 15 years. These limits point to group tendencies suggesting states in which certain types of variation are stable.

Wave-length changes accompany the intensity variations so far as

known. Such shifts of spectral features must be in a measure due to changes in intensity of emission components, but in addition real variations in wave-length are undoubtedly observed, probably due to radial velocity changes synchronizing with the alterations of intensity of the spectral lines. In a long period variable like H. D. 20336 with a velocity range of sixty kilometers and a period of 1690 days the total periodic movement involved, whether considered as orbital or as pulsatory, apparently must exceed a billion kilometers.

A list of eight ϕ Persei variables found at Ann Arbor with periods derived by the writer and a period for a ninth star, ζ Tauri, derived by Miss Losh are here given.

LIST OF ϕ PERSEI VARIABLES AND PERIODS FOUND AT ANN ARBOR.

Name	Right Ascension		Period
	h	m	
H. D. 20336	3	11.2	1690 days
X Persei	3	49.1	Several years
25 Orionis	5	19.5	1875 days
ζ Tauri	5	31.7	15± years
κ Draconis	12	29.2	4000 days
b^3 Cygni	20	5.7	1373 days
ν Cygni	21	13.8	1800 days
o Aquarii	21	58.1	1900± days
π Aquarii	22	20.2	2000± days

As a basis for further study, it is suggested that the spectrum variables of the ϕ Persei group and possibly all stars with Class Be spectra are giants of critically large mass in which radiation and other outward pressure stands in close balance with gravitation, especially in the external layers. Periodically, the outward pressure exceeds gravity and an extensive outward motion takes place. This outward motion more than relieves the pressure from below and a general recession takes place completing the cycle.

HYPOTHETICAL PARALLAXES OF TWENTY-EIGHT STARS.

BY PHILIP FOX.

Various astronomers have given formulae for the derivation of hypothetical or dynamical parallaxes based on the motion of double stars, the constants involved being determined from assumed masses, inclinations, etc. The formulae of Jackson and Furner (*M. N.* **81**, 2, 1920) are readily applicable and give approximations probably as close as any. Using the formula,

$$\pi_h = (1.34\,\rho_2/t^{2/3})\,[(\Delta\theta/360)^2 + (2\rho_2 - \rho_1 - \rho_3)/\pi^3\rho_2)]^{1/3}$$

and omitting the last term in cases where the distance is approximately constant, parallaxes have been computed for the stars of the list which were shown in a lantern slide.

These results will be presented more fully in *Annals of the Dearborn Observatory*, Volume II, now in press.

(To be continued.)

PLANET NOTES FOR NOVEMBER.

The *Sun* will be moving southeastward through the constellations Libra and Scorpio during November. At the end of the month it will be about four degrees directly north of the bright star Antares.

THE CONSTELLATIONS AT 9:00 P. M. NOVEMBER 1.

The phases of the *Moon* will occur as follows:

Last Quarter	Nov.	8	at 9 A.M.	C.S.T.
New Moon		16	" 1 A.M.	"
First Quarter		22	" 8 P.M.	"
Full Moon		30	" 2 A.M.	"

The moon will be farthest from the earth on November 7 and nearest to the earth on November 19.

Mercury will reach a point of greatest elongation east on November 22. It will then be more than an hour and a half east of the sun and about six degrees south of it. It will be very near the third magnitude star θ Ophiuchi at this time. It will be a favorable time to look for this planet.

Venus will reach a point of greatest elongation east on November 28. On and near this date it will cross the meridian a little after three o'clock in the afternoon. It will be in the constellation Sagittarius. Since only about one-half of the illuminated disk will be visible from the earth, this planet will not be as brilliant as it is at times. It will, however, be much brighter than any stars in its vicinity in the sky.

Mars will be a short distance west of the sun during November. It will be visible in the east just before sunrise, but too low for favorable study. It will be in the constellation Virgo, a short distance east of Spica.

Jupiter will continue to be visible in the southwest in the evening during November. During the latter part of the month Jupiter and Venus will be only a few degrees apart in the sky and will attract attention because of their brilliancy.

Saturn will be a short distance east of the sun at the beginning of the month, will be in conjunction with the sun on November 9, and after that will be west of the sun. However, throughout the month it will be too near the sun to be seen.

Uranus will be found in the constellation Pisces and will be visible in the evening sky during the month.

Neptune will be in quadrature, 90° west of the sun, on November 17. It will therefore be on the meridian at six in the morning, and will be visible before sunrise.

Occultations Visible at Washington.

[From the *American Ephemeris.*]

Date 1925	Star's Name	Magnitude	IMMERSION. Washington C.T.	IMMERSION. Angle from N	EMERSION. Washington C.T.	EMERSION. Angle from N	Duration
			h m	°	h m	°	h m
Nov. 4	15 Geminorum	6.5	22 53	98	0 1	240	1 7
21	30 Capricorni	5.4	20 20	65	21 26	252	1 5
23	ψ Aquarii	4.5	23 58	33	0 46	279	0 49
27	ξ^2 Ceti	4.3	15 51	74	16 48	239	0 57
29	64 Tauri	4.9	23 59	40	1 14	283	1 15

VARIABLE STARS.

Nova Pictoris. — From the Harvard Bulletin 823 we learn that a comparison of photographs of the region of Nova Pictoris indicates that there was an uncatalogued star in the place of the nova prior to 1925. Its magnitude was 12.75. The star appears on the earliest Harvard photographs of the region in 1889 and 1890. Photographs are available for all years from 1894 to 1925, but show no variation in the star's brightness during that time. The star was of normal brightness as late as December 26, 1924, but on April 13, 1925, nearly two months before its maximum light, it was of the third magnitude.

Minima of Variable Stars of Short Period.

[Calculated by members of the classes in Astronomy at Carleton College.]

Given to the nearest hour in Greenwich civil time; to obtain Eastern Standard time subtract 5^h; Central Standard time 6^h, etc.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of minima in 1925 November					
	h m	° ′		d h	d h	d h	d h	d h	d h	d h
SY Androm.	0 08.0	+43 09	9.5—13.0	34 21.8	9 12					
RT Sculptor.	31.5	—26 13	9.6—10.5	0 12.3	1 22	9 14	17 6	24 22		
U Cephei	0 53.4	+81 20	7.0— 9.0	1 11.8	6 1	13 13	21 0	28 12		
Z Persei	2 33.7	+41 46	9.4—12	3 01.4	3 4	9 7	21 12	27 15		
TW Cassiop.	37.6	+65 19	8.2— 9.0	1 10.3	1 5	9 19	18 9	26 22		
RY Persei	39.0	+47 43	8.0—10.3	6 20.7	5 23	12 20	19 17	26 13		
RZ Cassiop.	39.9	+69 13	6.9— 8.1	1 04.7	3 3	10 7	17 11	24 15		
TX Cassiop.	44.4	+62 22	9.4—10.1	2 22.2	1 8	10 3	18 21	27 16		
ST Persei	53.7	+38 47	8.5—10.5	2 15.6	7 20	15 19	23 17			
RX Cassiop.	2 58.8	+67 11	8.6— 9.1	32 07.6	4 10					
Algol	3 01.7	+40 34	2.3— 3.5	2 20.8	3 6	11 20	20 10	29 1		
RT Persei	16.7	+46 12	9.5—11.5	0 20.4	5 10	12 5	19 0	25 20		
λ Tauri	55.1	+12 12	3.3— 4.2	3 22.9	1 6	9 4	17 1	24 23		
RW Tauri	3 57.8	+27 51	7.1— [11	2 18.5	6 18	15 1	23 9			
RV Persei	4 04.2	+33 59	9.5—11.0	1 23.4	8 16	16 14	24 11			
RW Persei	13.3	+42 04	8.8—11.0	13 04 8		11 15	24 20			
SZ Tauri	31.4	+18 20	7.2— 7.7	3 03.6	2 20	9 4	21 18	28 1		
RS Cephei	4 48.6	+80 06	9.5—12.0	12 10.1	1 14	14 1	26 10			
TT Aurigae	5 02.8	+39 27	7.8— 8.7	0 16.0	4 22	11 14	18 5	24 21		
RY Aurigae	11.5	+38 13	10.7—11.7	2 17.5	6 11	14 15	22 20			
RZ Aurigae	42.9	+31 40	10.6—13.3	3 00.3	1 11	7 11	19 12	25 13		
SV Tauri	45.8	+28 05	9.4—11.0	2 04.0	1 11	10 3	18 19	27 11		
Z Orionis	50.2	+13 40	9.7—10.7	5 04.9	7 14	18 0	28 9			
SV Gemin.	54.6	+24 28	9.8— [11	4 00.2	8 17	16 17	24 18			
RW Gemin.	5 55.4	+23 08	9.5—11.0	2 20.8	3 6	9 0	20 11	26 5		
U Columbæ	6 11.2	—33 03	9.2—10.0	2 19.2	5 7	10 22	22 3	27 17		
SX Gemin.	22.0	+20 37	10.8—11.5	1 08.8	3 11	11 16	19 20	28 1		
RW Monoc.	29.3	+ 8 54	9.0—10.8	1 21.7	4 6	11 21	19 12	27 3		
RX Gemin.	43.6	+33 21	8.8— 9.6	12 05.0		10 12	22 17			
RU Monoc.	6 49.4	— 7 28	9.8—10.5	0 21.5	7 13	14 17	21 21	29 1		
R Can. Maj.	7 14.9	—16 12	5.8— 6.4	1 03.3	7 2	13 21	20 17	27 12		
RY Gemin.	21.7	+15 52	8.9— [10	9 07.2	6 2	15 9	24 16			
Y Camelop.	27.6	+76 17	9.5—12	3 07.3	3 11	10 2	23 7	29 22		
TX Gemin.	30.3	+17 08	10.0—11.9	2 19.2	5 15	14 0	22 10	30 19		
RR Puppis	43.5	—41 08	9.4—10.7	6 10.3	6 9	12 19	19 5	25 15		
V Puppis	7 55.4	—48 58	4.1— 4.8	1 10.9	6 6	13 12	20 19	28 1		
X Carinae	8 29.1	—58 53	7.9— 8.7	0 13.0	1 18	9 21	18 0	26 3		
S Cancri	8 38.2	+19 24	8.2—10	9 11.6	1 12	10 23	20 11	29 23		
RX Hydrae	9 00.8	— 7 52	9.1—10.5	2 06.8	5 23	12 19	19 15	26 1		
S Velorum	29.4	—44 46	7.8— 9.3	5 22.4	1 0	12 21	18 20	30 17		
Y Leonis	9 31.1	+26 41	9.3—11.2	1 16.5	7 2	13 20	20 14	27 7		
RR Velorum	10 17.8	—41 36	10.0—10.9	1 20.5	5 0	12 10	19 20	27 6		
SS Carinæ	10 54.2	—61 23	12.2—12.8	3 07.2	4 9	11 0	24 4	30 19		
ST Urs. Maj.	11 22.4	+45 44	6.7— 7.2	8 19.2	4 21	13 16	22 12			
RW Urs. Maj.	35.4	+52 34	10.3—11.4	7 07.9	7 5	14 13	21 21	29 5		
Z Draconis	11 39.8	+72 49	9.9—13.6	1 08.6	1 19	8 13	22 3	28 22		
RZ Centauri	12 55.6	—64 05	8.5— 8.9	1 21.0	1 11	8 23	16 12	24 0		
RS Can. Ven.	13 06.3	+36 28	7.5—12.5	4 19.1	7 16	17 7	26 21			
SS Centauri	07.2	—63 37	8.8—10.4	2 11.5	6 15	14 1	21 12	28 22		
SX Hydræ	13 39.0	—26 23	8.6—12.7	2 21.5	2 1	7 20	19 10	25 5		

Minima of Variable Stars of Short Period—Continued.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of minima in 1925 November							
	h m	° ′		d h	d h	d h	d h	d h	d h	d h	d h	d h
δ Libræ	14 55.6	— 8 07	4.8— 6.2	2 07.9	3 16	10 16	17 15	24 15				
U Coronæ	15 14.1	+32 01	7.6— 8.7	3 10.9	5 17	12 15	19 13	26 10				
TW Draconis	15 32.4	+64 14	7.3— 8.9	2 19.4	3 5	11 16	20 2	28 12				
SS Libræ	15 43.4	—15 14	9.3—11.5	0 18.4	2 21	10 1	17 6	24 10				
SW Ophiuchi	16 11.1	— 6 44	9.2—10.0	2 10.7	4 19	12 3	19 12	26 20				
SX Ophiuchi	12.6	— 6 25	10.5—11.2	2 01.5	6 19	15 1	23 7					
R Aræ	31.1	—56 48	6.8— 7.9	4 10.2	5 3	13 23	22 19					
TT Herculis	16 49.9	+17 00	8.9— 9.3	20 18.1	8 4		28 22					
TU Herculis	17 09.8	+30 50	9.5—12	2 06.4	6 5	13 1	19 19	26 15				
U Ophiuchi	11.5	+ 1 19	6.0— 6.7	0 20.1	6 12	14 21	23 7					
u Herculis	13.6	+33 12	4.6— 5.4	2 01.2	7 1	13 4	19 8	25 12				
TX Herculis	15.4	+42 00	8.3— 9.0	1 00.7	4 7	10 11	22 20	29 1				
RV Ophiuchi	29.8	+ 7 19	9. —12	3 16.5	7 11	14 20	22 5	29 14				
SZ Herculis	36.0	+33 01	9.5—10.3	0 19.6	5 16	13 20	22 1	30 5				
TX Scorpii	48.6	—34 13	7.5— 8.2	0 22.6	3 16	11 5	18 18	26 6				
UX Herculis	49.7	+16 57	8.8—10.5	1 13.2	4 0	11 18	19 11	27 5				
Z Herculis	53 6	+15 09	7.1— 7.9	3 23.8	7 7	15 7	23 6					
WX Sagittarii	53.6	—17 24	9.2—10.8	2 03.1	6 15	15 3	23 16					
WY Sagittarii	17 54.9	—23 01	9.5—10.6	4 16.0	1 7	10 16	20 0	29 8				
SX Draconis	18 03.0	+58 23	9.3—10.5	5 04.1	3 0	13 8	18 12	28 20				
RS Sagittarii	11.0	—34 08	5.9— 6.3	2 10.0	1 21	9 3	23 15	30 21				
V Serpentis	11.1	—15 34	9.5—11.1	3 10.9	4 10	11 8	18 6	25 3				
RZ Scuti	21.1	— 9 15	7.4— 8.3	15 03.2		13 2	27 3					
RZ Draconis	21.8	+58 50	9.5—10.2	0 13.2	3 22	11 2	18 6	25 10				
RX Herculis	26.0	+12 32	7.0— 7.6	0 21.3	6 6	15 8	20 11	27 14				
SX Sagittarii	39.7	—30 36	8.7— 9.8	2 01.8	3 20	12 3	20 11	28 18				
RR Draconis	40 8	+62 34	9.3—13	2 19.9	3 20	12 7	20 19	29 7				
RS Scuti	43.7	—10 21	9.3—10.3	0 15.9	5 4	11 20	18 11	25 2				
β Lyræ	46.4	+33 15	3.4— 4.1	12 21.8	3 18	16 16	29 14					
U Scuti	18 48.9	—12 44	9.1— 9.6	0 22.9	7 18	15 9	23 1	30 16				
RX Draconis	19 01.1	+58 35	9.3—10.2	1 21.4	3 10	11 0	18 14	26 4				
RV Lyræ	12.5	+32 15	11. —12.8	3 14.4	7 0	14 4	21 9	28 14				
RS Vulpec.	13.4	+22 16	6.9— 8.0	4 11.4	2 22	11 21	20 20	29 19				
U Sagittæ	14.4	+19 26	6.5— 9.0	3 09.1	1 16	8 11	21 23	28 17				
Z Vulpec.	17.5	+25 23	7.3— 8.5	2 10.9	7 9	14 17	22 2	29 11				
TT Lyræ	24.3	+41 30	9.4—11 6	5 05.8	3 4	13 16	18 21	29 9				
UZ Draconis	26.1	+68 44	9.0— 9.8	1 15.1	5 4	11 17	18 5	24 18				
SY Cygni	19 42.7	+32 28	10. —12	6 00.2	3 6	9 6	21 6	27 6				
WW Cygni	20 00.6	+41 18	9.3—13.4	3 07.6	1 14	8 6	21 12	28 3				
SW Cygni	03.8	+46 01	9. —11.7	4 13.8	4 2	13 6	17 19	26 23				
VW Cygni	11.4	+34 12	9.8—11.8	8 10.3	4 3	12 13	20 23	29 9				
RW Capric.	12.2	—17 59	8.8—10.6	3 09.4	5 20	12 15	19 10	26 5				
UW Cygni	19.6	+42 55	10.5—13	3 10.8	4 12	11 10	18 8	25 5				
V Vulpec.	32.3	+26 15	8.2— 9.8	37 19.0	6 4							
W Delphini	33.1	+17 56	9.4—12.1	4 19.4	5 10	15 1	24 16					
RR Delphini	38 9	+13 35	10.5—11.8	4 14.4	7 6	16 11	25 16					
Y Cygni	48.1	+34 17	7.1— 7.9	1 12.0	1 11	10 11	19 11	28 11				
WZ Cygni	49.3	+38 27	9.9—10.8	0 14.0	5 21	13 12	21 2	28 '				
RR Vulpec.	20 50.5	+27 32	9.6—11.0	5 01.2		10 15	20 17	30 20				
RY Aquarii	21 14.8	—11 14	8.8—10.4	1 23.2	6 23	14 20	22 17	30 15				
UZ Cygni	55.2	+43 52	8.9—11.6	31 07.3			22 21					
RT Lacertæ	21 57.4	+43 24	9.1—10.5	5 01.7	2 0	12 3	22 7					
RW Lacertæ	22 40.6	+49 08	10.2—11.2	5 04.4	4 18	15 4	20 8	30 17				
VW Pegasi	51.7	+32 42	10.0—10.6	5 06.4	3 21	14 10	19 16	30 5				
Y Piscium	23 29.3	+ 7 22	9.0—12.0	3 18.4	5 8	12 21	20 9	27 22				
TW Androm.	23 58.2	+32 17	8.6—11.5	4 02.9	8 11	16 17	24 23					

Maxima of Variable Stars of Short Period.

[Calculated by members of the classes in Astronomy at Carleton College.]

Given to the nearest hour in Greenwich civil time; to obtain Eastern Standard time subtract 5^h; Central Standard time 6^h, etc.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of maxima in 1925 November							
	h m	° ′		d h	d h	d h	d h	d h	d h	d h	d h	d h
SX Cassiop.	0 05.5	+54 20	8.6— 9.2	36 13.7	3 13							
SY Cassiop.	0 09.8	+57 52	9.3— 9.9	4 01.7	3 6	11 9	19 13	27 16				
RR Ceti	1 27.0	+ 0 50	8.3— 9.0	0 13.3	6 5	13 23	21 17	29 10				
RW Cassiop.	1 30.7	+57 15	8.9—11.0	14 19.2	8 0		22 20					
V Arietis	2 09.6	+11 46	8.3— 9.0	0 23.8	3 17	11 16	19 14	27 13				
SU Cassiop.	2 43.0	+68 28	6.5— 7.0	1 22.8	5 18	14 13	22 9	30 4				
RW Camelop.	3 46.2	+58 21	8.2— 9.4	16 00.0		12 22		29 7				
SX Persei	4 10.2	+41 27	10.4—11.2	4 07.0	6 6	14 20	23 10					
SV Persei	42.8	+42 07	8.8— 9.6	11 03.1	8 22	20 1						
RX Aurigæ	4 54.5	+39 49	7.2— 8.1	11 15.0		11 8	22 23					
SX Aurigæ	5 04.6	+42 02	8.0— 8.7	1 12.8	1 6	8 22	16 14	24 5				
SY Aurigæ	05.5	+42 41	8.4— 9.5	10 03.3	8 16	18 19	28 22					
Y Aurigæ	21.5	+42 21	8.6— 9.6	3 20.6	4 20	12 13	20 6	28 0				
RZ Gemin.	5 56.6	+22 15	9.1—10.0	5 12.7	2 0	13 2	18 14	29 16				
RS Orionis	6 16.5	+14 44	8.2— 8.9	7 13.6	2 0	9 13	17 3	24 16				
T Monoc.	19.8	+ 7 08	5.7— 6.8	27 00.3	8 5							
RT Aurigæ	23.0	+30 33	5.1— 6.0	3 17.5	3 14	11 1	18 12	25 23				
W Gemin.	29.2	+15 24	6.7— 7.5	7 22.0	5 2	13 0	20 22	28 20				
ξ Gemin.	6 58.2	+20 43	3.7— 4.3	10 03.7	3 5	13 9	23 13					
RU Camelop.	7 10.9	+69 51	8.5— 9.8	22 06.5	2 9		24 16					
RR Gemin.	7 15.2	+31 04	10.0—11.5	0 09.5	4 16	12 15	20 13	28 12				
V Carinae	8 26.7	—59 47	7.4— 8.1	6 16.7	5 16	12 9	19 2	25 18				
T Velorum	8 34.4	—47 01	7.6— 8.5	4 15.3	4 10	13 17	18 8	27 15				
V Velorum	9 19.2	—55 32	7.5— 8.2	4 08.9	8 7	17 1	25 18					
Z Leonis	9 46.4	+27 22	7.9— 9.6	56 08.7				30 13				
RR Leonis	10 02.1	+24 29	9.1—10.1	0 10.9	5 19	12 14	19 9	26 4				
SU Draconis	11 32.2	+67 53	8.9— 9.6	0 15.8	2 7	8 22	22 3	28 17				
S Muscae	12 07.4	—69 36	6.4— 7.3	9 15.8	9 11	19 3	28 19					
SW Draconis	12.8	+70 04	8.8— 9.6	0 13.7	4 7	12 6	20 6	28 5				
T Crucis	15.9	—61 44	6.8— 7.6	6 17.6	5 15	12 9	19 2	25 20				
R Crucis	18.1	—61 04	6.8— 7.9	5 19.8	3 5	9 1	20 17	26 13				
S Crucis	12 48.4	—57 53	6.5— 7.6	4 16.6	3 19	13 4	17 21	27 6				
W Virginis	13 20.9	— 2 52	8.7—10.4	17 06.5		15 9						
SS Hydræ	25.0	—23 08	7.4— 8.1	8 04.8	9 3	17 7	25 12					
RV Urs. Maj.	13 29.4	+54 31	9.2— 9.9	0 11.2	6 13	13 14	20 14	27 15				
ST Virginis	14 22.5	— 0 27	10.3—11.4	0 09.9	1 12	8 22	16 7	23 17				
V Centauri	25.4	—56 27	6.4— 7.8	5 11.9	4 3	9 15	20 14	26 2				
RS Bootis	29.3	+32 11	8.9—10.0	0 09.1	7 21	15 10	22 23	30 12				
R Triang.Austr.	15 10.8	—66 08	6.7— 7.4	3 09.3	2 22	9 17	23 6	30 1				
S Triang.Austr.	15 52.2	—63 29	6.4— 7.4	6 07.8	2 23	9 7	21 23	28 6				
S Normæ	16 10.6	—57 39	6.6— 7.6	9 18.1	5 15	15 9	25 3					
RW Draconis	33.7	+58 03	9.6—10.8	0 10.6	4 8	13 5	22 2	30 22				
RV Scorpii	16 51.8	—33 27	6.7— 7.4	6 01.5	4 8	10 9	22 12	28 14				
X Sagittarii	17 41.3	—27 48	4.4— 5.0	7 00.3	3 9	10 9	17 9	24 10				
Y Ophiuchi	47.3	— 6 07	6.1— 6.5	17 02.9	7 22		25 1					
W Sagittarii	17 58.6	—29 35	4.3— 5.1	7 14.3	1 14	9 4	16 19	24 9				
Y Sagittarii	18 15.5	—18 54	5.4— 6.2	5 18.6	3 12	9 6	20 20	26 14				
U Sagittarii	26.0	—19 12	6.5— 7.3	6 17.9	4 6	11 0	17 18	24 12				
Y Scuti	32.6	— 8 27	8.7— 9.2	10 08.3	5 20	16 5	26 13					
RZ Lyræ	39.9	+32 42	9.9—11.2	0 12.3	8 8	16 0	23 16					
RT Scuti	18 44.1	—10 30	9.1— 9.7	0 11.9	2 23	10 10	17 20	25 7				
κ Pavonis	18 46.6	—67 22	3.8— 5.2	9 02.2	2 23	12 2	21 4	30 6				
U Aquilæ	19 24.0	— 7 15	6.2— 6.9	7 00.6	2 9	9 10	23 11	30 11				

Maxima of Variable Stars of Short Period—Continued.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of maxima in 1925 November							
	h m	° ′		d h	d h	d h	d h	d h	d h	d h	d h	d h
XZ Cygni	19 30.4	+56 10	8.6— 9.3	0 11.2	2 5	9 5	23 5	30 5				
U Vulpec.	32.2	+20 07	6.5 - 7.6	7 23.5	8 1	16 1	24 1					
SU Cygni	40.8	+29 01	6.2— 7.0	3 20.3	8 10	16 3	23 19					
η Aquilæ	47.4	+ 0 45	3.7— 4.5	7 04.2	3 10	10 14	17 18	24 23				
S Sagittæ	51.5	+16 22	5.6— 6.4	8 09.2	1 4	9 14	17 23	26 8				
X Vulpec.	19 53.3	+26 17	9.5—10.5	6 07.7	4 17	11 0	23 16	29 23				
X Cygni	20 39.5	+35 14	6.0— 7.0	16 09.3	7 21		24 7					
T Vulpec.	47.2	+27 52	5.5— 6.1	4 10.5	5 4	14 1	18 12	27 9				
UY Cygni	52.3	+30 03	9.6—10.4	0 13.5	4 13	11 7	18 0	24 18				
RV Capric.	55.9	—15 37	9.2—10.1	0 10.7	2 23	9 17	23 3	29 20				
TX Cygni	20 56.4	+42 12	8.5— 9.7	14 17.4		13 23		28 17				
VY Cygni	21 00.4	+39 34	8.8— 9.5	7 20.6	3 15	11 12	19 8	27 5				
SW Aquarii	10.2	— 0 20	9.9—10.8	0 11.0	1 14	8 13	22 7	29 5				
VZ Cygni	21 47.7	+42 40	8.2— 9.2	4 20.7	5 9	15 2	19 23	29 17				
Y Lacertæ	22 05.2	+50 33	9.1— 9.6	4 07.8	4 1	12 17	21 8	29 1				
δ Cephei	25.5	+57 54	3.7— 4.6	5 08.8	3 1	13 19	19 3	29 21				
Z Lacertæ	36.9	+56 18	8.2— 9.0	10 21.1	11 1		21 22					
RR Lacertæ	37.5	+55 55	8.5— 9.2	6 10.1	6 20	13 5	19 15	26 1				
V Lacertæ	44.5	+55 48	8.5— 9.5	4 23.6	1 6	11 5	16 5	26 4				
X Lacertæ	22 45.0	+55 54	8.2— 8.6	5 10.7	5 12	10 22	21 20	27 6				
SW Cassion.	23 03.7	+58 11	9.2— 9.7	5 10.6	2 9	13 6	18 17	29 14				
RS Cassiop	32.6	+61 52	9.0—11.0	6 07.1	6 4	12 18	18 18	25 1				
RY Cassio).	47.2	+58 11	9.3—11.8	12 03.4		11 13	23 16					
V Cephei	23 51.7	+82 38	6.0— 7.0	0 23.9	2 7	9 7	23 6	30 6				

Monthly Report of the American Association of Variable Star Observers, July and August, 1925.

Another double, and very creditable, report is presented herewith. Good observing weather has evidently prevailed in all sections where our observers are located. Forest fires have interfered somewhat with observers in western Canada and United States.

Nova Pictoris was followed very closely by our southern observers, at least until it became too low on the horizon for further observation. Confirmatory observations on SS Aurigae by Messrs. Waterfield and Cunningham indicate a maximum about the middle of June. Considering the very low altitude of this star, these observers deserve due commendation. A glance at the records of R Cor. Bor. and SS Cygni will show that no marked fluctuations in these irregular stars escaped the watchful eye of our members.

Rev. T. C. H. Bouton, our veteran observer now located at St. Petersburg, Fla., renewed old acquaintances with the New England members of the Association during July. Vice President Howard O. Eaton spent a greater part of the summer in France. Secretary and Mrs. W. T. Olcott will soon return from their sojourn in the British Isles and the Continent. President Yalden and Dean Potter have been the guests of Dr. Godfrey at the latter's camp in Maine, and although few if any observations were secured, doubtless the future of the AAVSO was carefully planned out.

A meeting of considerable importance and interest to our mid-western members was held at the Yerkes Observatory on September 4 and 5. Director Frost cordially welcomed the members and their friends and extended to them an in-

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925.

June 0 = J. D. 2424302 July 0 = J. D. 2424332 August 0 = J. D. 2424363

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
001046 X ANDROMEDAE—						
	4317.4	13.2	Wf	4344.4	10.8	Bi
	4319.3	13.2	Cu	4345.3	10.8	Wf
	4322.3	12.9	Wf	4345.3	10.8	Wf
	4324.3	12.9	Wf	4359.3	9.9	Wf
	4329.3	12.2	Wf	4361.2	9.5	Br
	4338.3	11.6	Wf	4378.3	9.3	Bi
001630 T CETI—						
	4256.7	6.1	Kd			
001726 T ANDROMEDAE—						
	4320.4	13.3	Bi	4360.3	11.7	Pt
	4328.3	11.7	Bi	4366.4	10.8	Bi
	4344.4	11.7	Bi	4378.3	9.5	Bi
001725 T CASSIOPEIAE—						
	4319.3	12.0	Cu	4379.2	9.7	Jo
	4328.3	11.9	Pt	4380.1	9.8	Jo
	4360.3	11.0	Pt	4381.2	11.2	Du
	4375.1	11.2	Du			
001838 R ANDROMEDAE—						
	4301.9	8.8	Ch	4343.0	9.5	Lp
	4309.3	9.0	Cu	4345.3	9.2	Wf
	4317.4	9.2	Wf	4346.9	9.5	Lp
	4319.3	9.3	Cu	4348.4	9.4	Wf
	4322.3	8.9	Wf	4350.3	9.5	Gb
	4322.3	8.8	Cy	4350.9	9.6	Lp
	4323.3	8.8	Gb	4356.2	9.7	Cy
	4324.3	8.9	Wf	4356.3	9.1	Jo
	4328.3	8.8	Pt	4358.4	9.5	Wf
	4329.3	9.2	Wf	4359.8	9.6	Lp
	4331.3	8.6	Gb	4360.3	9.6	Pt
	4337.3	9.0	Wf	4361.3	9.7	Wf
	4340.0	9.5	Lp	4362.2	9.5	Br
	4342.2	9.2	Gb	4379.2	10.0	Jo
001862 S TUCANAE—						
	4283.4	12.7	Bl	4330.9	8.2	Sm
	4322.9	8.2	Sm			
003179 Y CEPHEI—						
	4356.2	[13.1	Br			
004047 U CASSIOPEIAE—						
	4317.4	14.2	Wf	4345.3	11.6	Wf
	4324.3	13.9	Wf	4360.3	10.5	Pt
	4329.3	13.1	Wf	4361.2	10.5	Br
	4338.3	12.4	Wf	4368.4	11.0	Wf
	4344.5	11.9	Bi	4378.4	9.5	Bi
004435 V ANDROMEDAE—						
	4320.4	[13.0	Bi	4366.4	12.6	Bi
	4344.4	13.4	Bi	4378.3	11.7	Bi
004533 RR ANDROMEDAE—						
	4317.4	11.6	Wf	4338.3	11.0	Wf
	4324.3	11.6	Wf	4345.3	10.8	Wf
	4329.3	11.1	Wf	4358.3	9.9	Wf
004746a RV CASSIOPEIAE—						
	4317.4	14.4	Wf	4358.4	10.1	Wf
	4324.4	14.1	Wf	4360.3	9.6	Pt
	4329.3	14.1	Wf	4361.3	9.6	Br
	4343.3	13.0	Wf	4376.2	8.5	Du
004746b — CASSIOPEIAE—						
	4328.3	11.0	Pt	4358.4	10.4	Wf
	4329.3	10.6	Wf	4360.3	10.8	Pt
	4343.3	10.6	Wf			
004958 W CASSIOPEIAE—						
	4308.2	8.9	Cu	4344.8	8.7	Lp
	4314.0	8.7	Lp	4347.2	8.8	Du
	4318.0	8.5	Lp	4349.8	8.7	Lp
	4322.2	8.6	Cu	4351.1	8.8	Du
	4326.2	8.8	Du	4356.9	8.6	Lp
	4328.3	8.5	Pt	4360.3	8.5	Pt
	4329.3	8.7	Du	4362.8	8.7	Lp
	4333.2	8.6	Du	4375.2	8.8	Du
	4344.2	9.0	Du	4381.2	9.1	Du
005475 U TUCANAE—						
	4274.4	11.9	Bl	4315.4	8.8	Bl
	4281.7	11.2	Sm	4315.8	8.7	Sm
	4283.4	11.3	Bl	4322.8	8.5	Sm
	4288.7	10.8	Sm	4327.8	8.9	Sm
	4300.4	10.1	Bl	4332.4	8.5	Bl
005840 RX ANDROMEDAE—						
	4334.3	12.4	Pt	4356.2	[12.6	Pt
	4335.3	13.0	Pt	4360.3	[13.0	Pt
	4354.2	[12.4	Pt	4361.2	[11.7	Pt
	4355.2	[12.4	Pt	4379.2	[11.7	Pt
010102 T CETI—						
	4360.3	13.1	Pt			
010940 V ANDROMEDAE—						
	4317.4	12.2	Wf	4343.2	12.8	Wf
	4324.4	12.3	Wf	4358.4	13.2	Wf
	4329.3	12.4	Wf			
011041 UZ ANDROMEDAE—						
	4317.4	15.0	Wf	4343.3	14.7	Wf
	4324.4	15.0	Wf	4358.4	14.4	Wf
	4329.3	14.8	Wf			
011272 S CASSIOPEIAE—						
	4309.2	10.3	Cu	4344.8	10.7	Lp
	4317.4	10.0	Wf	4348.4	10.4	Wf
	4318.0	10.2	Lp	4349.8	11.0	Lp
	4320.9	10.5	Lp	4356.2	10.8	Br
	4322.2	9.9	Cu	4358.4	10.5	Wf
	4324.4	10.2	Wf	4358.8	11.8	Lp
	4328.3	10.3	Pt	4360.3	10.7	Pt
	4329.3	10.2	Wf	4362.3	10.6	Wf
	4338.4	10.3	Wf	4362.8	11.2	Lp
	4340.0	10.4	Lp	4376.1	11.0	Du
	4344.3	9.9	Bi	4378.4	10.4	Bi
	4344.4	10.3	Wf			
011712 U PISCIUM—						
	4334.3	11.6	Pt	4360.3	11.5	Pt
012502 R PISCIUM—						
	4360.3	12.1	Pt			
013238 RU ANDROMEDAE—						
	4317.4	10.7	Wf	4334.3	10.8	Pt
	4324.4	10.8	Wf	4345.3	11.0	Wf
	4329.3	10.7	Wf	4358.4	12.0	Wf
013338 Y ANDROMEDAE—						
	4334.3	9.4	Pt	4360.3	10.0	Pt
014958 X CASSIOPEIAE—						
	4334.3	12.5	Pt	4360.3	11.8	Pt
015354 U PERSEI—						
	4334.3	8.2	Pt	4360.3	8.4	Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
021024 R ARIETIS—						
	4324.4	8.3	Wf	4358.2	11.2	Jo
	4337.4	9.0	Wf	4358.4	9.9	Wf
	4334.3	8.9	Pt	4360.0	10.4	Lp
	4345 4	9.2	Wf	4360.3	10.5	Pt
	4350.3	9.5	Gb	4362.3	10.5	Wf
	4356.2	10.2	Cy	4366.4	10.3	Bi
021143a W ANDROMEDAE—						
	4317.4	13.0	Wf	4345.3	13.4	Wf
	4324.4	13.3	Wf	4346.3	13.6	Wf
	4329.3	13.4	Wf	4348.4	13.7	Wf
	4334.3	13.0	Pt	4358.4	13.7	Wf
	4337.4	13.2	Wf	4360.3	13.4	Pt
	4344.3	13.4	Wf			
021258 T PERSEI—						
	4334.3	8.8	Pt	4360 3	12.1	Pt
021281 Z CEPHEI—						
	4318.2	11.2	Wf	4343.3	11.7	Wf
	4324.4	11.0	Wf	4356.3	12.2	Br
	4334.3	11.6	Pt	4359.3	12.9	Wf
	4329.4	11.4	Wf	4360.3	8 3	Pt
021403 o CETI—						
	4355.1	8.5	L	4378.4	9.0	Gb
	4360.3	8.6	Pt			
021558 S PERSEI—						
	4318.0	11.5	Lp	4351.9	[11.3	Kl
	4334.3	11.2	Pt	4358.8	11.0	Lp
	4340.0	11.3	Lp	4360.3	10.6	Pt
	4344.8	11.3	Lp	4362.9	11.0	Lp
	4350.8	11.0	Lp			
022150 RR PERSEI—						
	4318.4	11.4	Wf	4343.3	12.2	Wf
	4324.4	11.6	Wf	4358.4	12.6	Wf
	4329.4	11.8	Wf	4360.3	13.0	Pt
	4334.3	12.0	Pt			
022813 U CETI—						
	4360.3	8.4	Pt			
022980 RR CEPHEI—						
	4318.3	14.2	Wf	4343.3	14.0	Wf
	4324.4	14.1	Wf	4358.4	13.9	Wf
	4329.4	14.0	Wf	4360.3	13.0	Pt
023133 R TRIANGULI—						
	4334.3	8.5	Pt	4366.4	6.5	Bi
	4356.2	8.3	Cy	4380.3	6.5	Jo
	4360.3	7.5	Pt	4381.2	6.7	Jo
024356 W PERSEI—						
	4322.3	9.2	Cy	4355.3	9.8	Cy
	4334.3	9.2	Pt	4360.3	9.0	Pt
	4335.2	9.0	Cy	4361.3	9.9	Cy
	4351.2	9.6	Cm	4386.1	9.4	Cm
025050 R HOROLOGII—						
	4283.4	13.2	Bl			
025751 T HOROLOGII—						
	4283.4	12.4	Bl			
031401 X CETI—						
	4360.3	8.9	Pt			
032043 Y PERSEI—						
	4334.3	9.0	Pt	4360.3	9.7	Pt
032335 R PERSEI—						
	4324.4	9.4	Wf	4358.4	8.9	Wf
	4334.3	8.5	Pt	4359.9	8.9	Lp
032335 R PERSEI—Continued.						
	4337.4	8.8	Wf	4360.3	8 9	Pt
	4345.4	8.8	Wf	4362.3	8.9	Wf
042209 R TAURI—						
	4360.3	12.6	Pt			
042215 W TAURI—						
	4360.3	10.4	Pt			
042309 S TAURI—						
	4360.3	9.8	Pt			
043065 T CAMELOPARDALIS—						
	4306.9	8.3	L	4355.1	7.7	L
	4334.3	7.7	Pt	4360.3	8.0	Pt
043263 R RETICULI—						
	4283.4	[12.5	Bl	4294.7	[12.2	Ht
	4289.7	12.2	Ht	4315.7	[12.2	Sm
043274 X CAMELOPARDALIS—						
	4315.1	[12.8	Cu	4360.3	10.3	Pt
043562 R DORADUS—						
	4274.4	4.9	Bl	4294.7	5.2	Ht
	4275.7	5.5	Ht	4296.7	5.2	Sm
	4281.7	5.2	Sm	4300.4	5.5	Bl
	4282.7	5.5	Ht	4315.4	5.5	Bl
	4283.4	5.0	Bl	4323.4	5.5	Bl
	4288.7	5.2	Sm	4315.7	5.2	Sm
	4289.7	5.5	Ht	4332.4	6.0	Bl
043738 R CAELI—						
	4274.4	8.3	Bl	4283.4	8.5	Bl
	4275.7	8.3	Ht	4300.4	8.8	Bl
	4282.7	8.1	Ht			
044349 R PICTORIS—						
	4274.4	7.8	Bl	4315.4	8.4	Bl
	4283.4	7.9	Bl	4323.4	8.5	Bl
	4300.4	8.3	Bl	4332.4	8.5	Bl
044617 V TAURI—						
	4360.3	11.9	Pt			
050022 T LEPORIS—						
	4274.4	10.8	Bl	4283.4	11.6	Bl
050848 S PICTORIS—						
	4274.4	8.2	Bl	4296.7	10.2	Sm
	4281.7	9 6	Sm	4300.4	9.6	Bl
	4283.4	9.4	Bl	4315.4	10.1	Bl
	4288.7	10.0	Sm	4323.4	10.4	Bl
050953 R AURIGAE—						
	4314.1	7.3	Cu	4337.3	7.8	Wf
	4317.2	7.4	Wf	4345.3	8.1	Wf
	4323.3	7.4	Wf	4348.3	8.1	Wf
	4327.3	7.4	Wf	4358.4	8.2	Wf
	4331.3	7.7	Wf	4360.0	9.5	Gd
	4335.3	7.2	Pt	4360.3	8.3	Pt
051247 T PICTORIS—						
	4274.4	10.1	Bl	4283.4	10.5	Bl
	4275.7	10.0	Ht	4288.7	11.0	Sm
	4281.7	10.6	Sm	4294.7	11.5	Ht
	4282.7	10.9	Ht	4296.7	11.8	Sm
051533 T COLUMBAE—						
	4274.4	9.3	Bl	4289.7	8.7	Ht
	4275.7	9.7	Ht	4294.7	8.4	Ht
	4281.7	8.5	Bl	4296.7	8.4	Sm
	4282.7	9.0	Ht	4306.4	8.5	Bl
	4283.4	8.5	Bl	4315.4	7.8	Bl
	4288.7	8.7	Sm	4323.4	7.6	Bl

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
052034 S AURIGAE—						
	4260.0	9.4	Gd	4360.3	8.9	Pt
052036 W AURIGAE—						
	4360.3	12.8	Pt			
053068 S CAMELOPARDALIS—						
	4335.3	9.0	Pt	4360.3	8.3	Pt
054321 S COLUMBAE—						
	4274.4	9.4	Bl	4289.7	10.0	Ht
	4275.7	9.9	Ht	4294.7	10.2	Ht
	4281.7	9.7	Sm	4296.7	9.9	Sm
	4282.7	10.2	Ht	4306.4	10.2	Bl
	4283.4	9.7	Bl	4315.4	11.2	Bl
	4288.7	9.9	Sm	4314.7	11.1	Sm
054629 R COLUMBAE—						
	4274.4	9.5	Bl	4296.7	9.9	Sm
	4281.7	9.3	Sm	4300.4	9.1	Bl
	4283.4	9.4	Bl	4315.4	9.2	Bl
	4288.7	9.1	Sm	4323.4	10.0	Bl
054974 V CAMELOPARDALIS—						
	4317.3	[15.2	Wf	4343.3	[15.0	Wf
	4324.3	[15.2	Wf	4346.3	[15.2	Wf
	4326.3	15.3	Wf	4359.3	[14.2	Wf
	4330.3	[15 0	Wf			
055353 Z AURIGAE—						
	4281.6	10.7	Ch	4337.3	9.9	Wf
	4317.2	10.7	Wf	4345.3	9.8	Wf
	4321.3	10.6	Wf	4348.3	9.8	Wf
	4323.3	10.6	Wf	4358.4	9.9	Wf
	4326.3	10 4	Wf	4360.3	9.3	Pt
	4329.3	10.2	Wf			
055686 R OCTANTIS—						
	4274.4	11.6	Bl	4315.4	12.0	Bl
	4282.7	12.0	Sm	4315.8	[11.6	Sm
	4283.4	11.6	Bl	4322.8	[12.0	Sm
060450 X AURIGAE—						
	4274.6	9.0	Ch	4286.6	9 2	Ch
	4281.6	9.1	Ch	4315.1	11.3	Cu
	4284.6	9.1	Ch			
060547 SS AURIGAE—						
	4281.6	[11.6	Ch	4321.3	11.2	Wf
	4282.2	[11.6	Ch	4321.1	11.0	Cu
	4283.6	[11.6	Ch	4322.1	10.9	Cu
	4284.6	[11.6	Ch	4323.3	11.0	Wf
	4285.6	[11.6	Ch	4324.3	11.3	Wf
	4286.6	[11.6	Ch	4326.1	[11.0	Cu
	4304.1	[11.0	Cu	4326.3	12.1	Wf
	4305.1	[11.0	Cu	4330.3	[12.4	Wf
	4313.8	[11.0	L	4348.3	[13.3	Wf
	4314.1	[11.8	Cu	4355.9	[12.4	L
	4315.1	[11.6	Cu	4358.4	[13.0	Wf
	4317.2	10.3	Wf	4360.3	[12.6	Pt
063462 NOVA PICTORIS—						
	4299.7	2.5	Sm	4310.5	1.0	Bl
	4300.4	2.5	Bl	4310.5	1.1	Bl
	4300.7	2.5	Sm	4313.4	1.7	Bl
	4305.4	2.3	Bl	4314.4	1.7	Bl
	4305.5	2.3	Bl	4315.4	1.9	Bl
	4306.3	2.0	Bl	4315.4	1.9	Bl
	4306.4	1.9	Bl	4318.3	2.2	Bl
	4306.4	2.0	Bl	4319.4	1.9	Bl
	4306.5	2.1	Bl	4323.4	3.2	Bl
063462 NOVA PICTORIS—Continued.						
	4308.4	1.4	Bl	4324.4	3.2	Bl
	4308.4	1 3	Bl	4330.4	3.6	Bl
	4308.5	0.9	Bl	4331.4	3.7	Bl
	4308.6	1.0	Bl	4332.4	3.7	Bl
	4310.5	1.1	Bl			
065111 Y MONOCEROTIS—						
	4284.6	9.5	Ch			
065355 R LYNCIS—						
	4314.1	9.4	Cu	4327.3	8.5	Wf
	4317.3	8 5	Wf	4337.3	8.3	Wf
	4323.3	8.4	Wf			
070109 V CANIS MINORIS—						
	4284.6	[10.3	Ch			
070772 R VOLANTIS—						
	4282.7	[12.6	Ht	4315.8	[12.6	Sm
	4289.7	[12.6	Ht	4322.7	[12.6	Ht
	4288.8	[12.6	Sm	4328.7	[11.8	Ht
	4296.7	[12.6	Ht			
071201 RR MONOCEROTIS—						
	4284.6	[10.6	Ch			
072708 S CANIS MINORIS—						
	4274.0	8.4	Ch	4286.6	8.8	Ch
	4281.6	8.5	Ch			
073173 S VOLANTIS—						
	4274.4	12.0	Bl	4315.4	13.0	Bl
	4283.4	12.5	Bl			
073723 S GEMINORUM—						
	4276.6	9.8	Ch	4304.6	[10.1	Ch
	4284.6	10.0	Ch			
074241 W PUPPIS—						
	4274.5	9.2	Bl	4300.4	11.2	Bl
	4275.7	9.4	Ht	4314.7	11.9	Sm
	4276.8	10.1	Sm	4315.4	11.4	Bl
	4281.8	9.6	Ht	4322.7	10.6	Ht
	4282.7	10.1	Sm	4322.7	10.7	Sm
	4283.4	9.9	Bl	4323.4	10.6	Bl
	4288.8	10.6	Sm	4327.7	10.1	Sm
	4289.7	10.8	Ht	4328.7	9.7	Ht
	4396.7	11.2	Ht	4332.4	9.5	Bl
	4296.7	11.2	Sm			
074323 T GEMINORUM—						
	4276.6	9.1	Ch	4299.6	9.2	Ch
	4284.6	9.1	Ch			
074922 U GEMINORUM—						
	4281.6	[12.3	Ch	4287.6	[11.7	Ch
	4283.6	[12.3	Ch	4291.6	[12.3	Ch
	4284.6	[12.3	Ch	4314.1	[10.2	Ch
	4285.6	[12.6	Ch	4314.6	[10.3	Ch
	4286.6	[12.3	Ch	4317.6	[10.1	Ch
075612 U PUPPIS—						
	4284.6	[10.4	Ch			
081112 R CANCRI—						
	4274.6	8.3	Ch	4302.6	8.9	Ch
	4284.6	8.6	Ch	4314.6	9.1	Ch
	4291.6	8.8	Ch			
081617 V CANCRI—						
	4284.6	[10.8	Ch			

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
082476 R CHAMELEONTIS—						
	4275.5	10.7	Bl	4315.4	7.9	Bl
	4281.7	10.6	Sm	4315.8	8.2	Sm
	4283.4	9.5	Bl	4322.7	8.4	Sm
	4288.8	9.0	Sm	4323.4	7.6	Bl
	4296.8	8.2	Sm	4327.7	8.4	Sm
	4300.4	7.8	Bl	4332.4	8.0	Bl
	4306.4	7.7	Bl			
083350 X URSAE MAJORIS—						
	4321.1	11.6	Pt			
084803 S HYDRAE—						
	4281.6	11.2	Ch	4314.6	[10.2	Ch
085008 T HYDRAE—						
	4285.6	9.5	Ch	4295.6	9.2	Ch
085120 T CANCRI—						
	4284.6	9.6	Ch	4314.6	9.8	Ch
091868 RW CARINAE—						
	4274.5	9.6	Bl	4315.4	11.2	Bl
	4283.4	9.7	Bl	4323.4	11.3	Bl
	4300.4	10.3	Bl	4332.4	[12.2	Bl
092551 Y VELORUM—						
	4274.5	13.0	Bl	4315.4	12.8	Bl
	4282.4	[12.1	Sm	4315.8	[12.4	Sm
	4283.4	12.9	Bl	4323.4	12.8	Bl
	4288.8	[12.4	Sm	4327.8	[12.4	Sm
	4306.4	[12.1	Bl			
092962 R CARINAE—						
	4274.5	9.1	Bl	4306.4	8.7	Bl
	4275.7	9.4	Ht	4315.4	8.8	Bl
	4276.8	9.4	Sm	4315.8	8.7	Sm
	4281.8	9.4	Ht	4322.7	8.8	Ht
	4282.8	9.2	Sm	4322.8	8.4	Sm
	4283.4	9.2	Bl	4323.4	8.2	Bl
	4288.8	9.4	Sm	4327.8	8.4	Sm
	4289.7	9.4	Ht	4328.7	8.8	Ht
	4296.7	9.2	Ht	4332.4	8.1	Bl
	4296.8	9.1	Sm			
093014 X HYDRAE—						
	4285.6	10.2	Ch			
093178 Y DRACONIS—						
	4323.2	9.2	Du	4351.1	[10.2	Du
	4326.1	9.3	Du	4351.3	10.3	Cy
	4326.2	9.4	Cy	4352.1	10.4	Du
	4333.1	9.6	Cy	4356.2	11.1	Cy
	4333.1	9.8	Du	4362.1	11.5	Cy
	4344.1	10.1	Du			
093934 R LEONIS MINORIS—						
	4275.6	7.7	Ch	4309.1	9.2	Cu
	4281.6	7.8	Ch	4314.6	9.3	Ch
	4294.7	8.2	Ch	4319.2	9.6	Cu
	4286.7	8.3	Ch	4321.1	9.5	Pt
	4289.7	8.7	Ch	4326.6	9.6	Ch
	4304.6	8.9	Ch			
094953 Z VELORUM—						
	4274.5	12.4	Bl	4296.7	[12.1	Ht
	4275.7	[12.1	Ht	4315.4	[12.8	Bl
	4281.8	[12.1	Ht	4315.8	[12.8	Sm
	4282.8	[12.1	Sm	4322.7	[12.1	Ht
	4283.4	13.1	Bl	4328.7	[12.1	Ht
	4289.7	[12.1	Ht			
095421 V LEONIS—						
	4284.7	[11.9	Ch	4324.3	[12.8	Wf
	4321.1	12.8	Pt	4326.2	[11.9	Sg
	4322.1	13.3	B			
095563 RV CARINAE—						
	4274.5	11.9	Bl	4315.4	12.8	Bl
	4283.5	11.8	Bl			
095814 RY LEONIS—						
	4289.9	8.8	Kl	4290.9	8.8	Kl
100661 S CARINAE—						
	4274.5	6.1	Bl	4306.4	5.5	Bl
	4275.7	6.0	Ht	4315.4	5.3	Bl
	4276.8	6.0	Sm	4315.8	5.5	Sm
	4281.8	6.0	Ht	4322.7	5.5	Ht
	4282.8	6.0	Sm	4323.4	5.0	Bl
	4283.5	5.5	Bl	4327.8	5.8	Sm
	4288.8	5.8	Bl	4327.8	5.5	Sm
	4289.7	5.7	Ht	4328.7	5.7	Ht
	4296.7	5.7	Ht	4332.4	5.0	Bl
	4296.8	5.7	Sm			
101058 Z CARINAE—						
	4288.8	[11.8	Sm	4315.8	[11.8	Sm
	4315.4	[12.3	Bl			
101153 W VELORUM—						
	4315.4	[13.0	Bl	4315.8	[12.0	Sm
103212 U HYDRAE—						
	4312.5	6.0	Kd	4314.5	6.0	Kd
103769 R URSAE MAJORIS—						
	4281.6	11.2	Ch	4331.3	13.0	Wf
	4314.1	12.2	Cu	4333.1	12.8	Cy
	4317.3	12.6	Wf	4337.3	12.8	Wf
	4320.3	12.8	Wf	4344.2	[12.0	Sg
	4321.1	[10.5	Mh	4345.3	13.1	Wf
	4321.1	12.0	Pt	4346.2	[10.5	Mh
	4322.1	12.4	B	4348.3	12.9	Wf
	4323.1	[10.5	Mh	4351.2	13.0	Cy
	4323.3	12.9	Wf	4353.2	12.6	Pt
	4326.2	[12.0	Sg	4358.3	12.8	Wf
	4327.3	12.9	Wf	4361.3	[11.5	Sg
	4327.6	[11.0	Ch	4362.3	12.7	Wf
104620 V HYDRAE—						
	4274.5	12.0	Bl	4315.4	11.2	Bl
	4283.5	12.0	Bl	4323.4	10.9	Bl
	4285.6	11.9	Ch	4332.4	11.0	Bl
	4306.4	11.0	Bl			
104628 RS HYDRAE—						
	4274.5	12.2	Bl	4315.4	11.1	Bl
	4283.5	12.5	Bl	4323.4	10.9	Bl
	4306.4	11.5	Bl	4332.4	10.6	Bl
104814 W LEONIS—						
	4285.7	9.8	Ch	4321.1	11.2	Pt
110361 RS CARINAE—						
	4282.7	[12.1	Sm	4315.8	[12.1	Sm
	4288.8	[12.3	Sm	4322.8	[12.1	Sm
110506 S LEONIS—						
	4285.7	[10.3	Ch			
111561 RY CARINAE—						
	4274.5	[13.1	Bl	4315.4	[13.1	Bl

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
111661 RS CENTAURI—						
	4274.5	12.9	Bl	4315.4	[13.1	Bl
	4282.7	[12.1	Sm	4315.8	[12.1	Sm
	4288.8	12.7	Sm	4327.8	[12.7	Sm
114441 X CENTAURI—						
	4274.5	12.5	Bl	4323.5	8.7	Bl
	4315.5	9.7	Bl	4332.1	8.2	Bl
	4316.4	10.7	Bl			
115058 W CENTAURI—						
	4274.5	9.2	Bl	4306.4	11.0	Bl
	4283.5	9.3	Bl	4315.4	11.8	Bl
115919 R COMAE BERENICES—						
	4286.7	9.5	Ch	4332.1	9.2	Ya
	4320.3	8.7	Wf	4338.3	9.3	Wf
	4321.1	9.0	Pt	4346.3	9.4	Wf
	4323.3	8.8	Wf	4353.2	9.8	Pt
	4327.3	9.2	Sg	4359.2	9.7	Wf
	4329.3	9.2	Wf			
120012 SU VIRGINIS—						
	4286.7	[11.7	Ch	4326.1	11.4	Cy
	4315.1	12.0	Gd	4353.2	9.6	Pt
	4321.1	11.4	Pt			
120905 T VIRGINIS—						
	4260.1	11.0	Gd	4326.2	11.2	Cy
	4321.1	11.2	Pt	4334.1	11.1	B
121418 R CORVI—						
	4322.1	12.1	B			
122001 SS VIRGINIS—						
	4310.9	7.7	L			
122532 T CANUM VENATICORUM—						
	4286.7	11.3	Ch	4321.1	12.5	Pt
	4318.0	12.4	Lp	4350.8	[12.6	Lp
	4321.0	12.7	Lp	4353.2	12.5	Pt
122803 Y VIRGINIS—						
	4322.1	[13.2	B	4326.1	[12.0	Cy
122854 U CENTAURI—						
	4274.5	9.9	Bl	4315.4	8.1	Bl
	4283.5	9.9	Bl	4323.4	8.3	Bl
	4306.4	8.5	Bl	4332.4	8.4	Bl
123160 T URSAE MAJORIS—						
	4308.2	8.1	Cu	4346.2	7.8	Ly
	4313.9	8.1	Lp	4346.2	7.6	Mh
	4317.3	8.0	Wf	4346.9	8.2	Lp
	4317.9	7.7	Lp	4347.1	7.8	Al
	4319.1	8.0	B	4348.1	7.5	Jo
	4319.2	7.6	Cu	4348.3	8.1	Wf
	4320.3	8.1	Wf	4349.	7.0	Ro
	4320.9	8.0	Lp	4350.8	8.2	Lp
	4321.1	8.0	Pt	4351.2	8.1	Cy
	4322.2	7.9	Ly	4351.2	7.9	Ly
	4323.1	8.3	Mh	4351.2	7.8	Cm
	4323.3	8.0	Wf	4352.1	7.4	Hb
	4325.5	7.9	Ls	4353.1	7.8	Jo
	4324.6	7.9	Ls	4353.2	12.5	Pt
	4326.2	7.9	Sg	4353.9	7.9	Lp
	4327.3	8.2	Wf	4355.2	7.8	Ly
	4327.5	7.9	Ls	4356.1	7.5	Jo
	4329.1	7.8	Jo	4357.1	7.8	Cm
	4329.6	8.0	Ls	4357.8	8.2	Lp
	4330.1	7.7	Ly	4358.2	7.8	Lp
	4331.2	7.0	Gb	4358.3	8.1	Wf
123160 T URSAE MAJORIS—Continued.						
	4331.3	8.2	Wf	4361.2	7.7	Wb
	4331.9	8.2	Lp	4361.3	8.0	Sg
	4332.1	7.7	Ya	4362.1	7.9	Al
	4333.1	7.8	Cy	4362.3	7.7	Wf
	4333.1	7.6	Jo	4362.8	8.2	Lp
	4337.3	7.7	Wf	4363.1	7.8	Jo
	4338.2	7.9	Ly	4368.2	8.1	Lp
	4339.9	8.0	Lp	4373.1	8.4	L
	4341.1	7.8	Ly	4374.1	8.4	Jo
	4322.2	7.8	Ly	4374.2	8.4	Wb
	4342.6	7.8	Ls	4377.1	8.4	Ly
	4343.	7.0	Ro	4378.2	8.4	Wb
	4343.1	7.3	Jo	4379.1	8.5	Jo
	4344.1	7.7	Cm	4379.2	8.4	Cm
	4344.2	7.8	Sg	4381.1	8.3	Al
	4345.3	7.9	Wf	4381.1	8.3	Al
	4346.2	7.8	Ly	4386.1	8.6	Cm
123307 R VIRGINIS—						
	4282.6	9.7	Ch	4326.2	10.0	Cy
	4313.9	10.7	L	4343.1	8.6	B
	4315.1	10.3	Gd	4350.1	8.1	Cy
	4321.1	10.1	Pt	4353.2	7.6	Pt
	4323.2	10.0	Mh			
123459 RS URSAE MAJORIS—						
	4281.6	10.2	Ch	4331.3	13.3	Wf
	4297.7	11.0	Ch	4332.1	[11.3	Ya
	4308.2	[12.6	Cu	4333.2	13.2	Cy
	4317.3	12.7	Wf	4343.3	13.8	Wf
	4319.2	13.1	B	4344.2	[12.8	Sg
	4319.2	12.9	Cu	4345.3	14.0	Wf
	4321.1	13.0	Pt	4346.2	[9.9	Mh
	4323.1	10.5	Mh	4347.1	[12.5	Al
	4323.3	13.2	Wf	4351.2	[13.2	Cy
	4324.2	13.2	Cy	4353.2	14.0	Pt
	4325.7	[10.6	Ch	4358.3	14.2	Wf
	4326.2	[12.2	Sg	4361.3	[12.6	Sg
	4327.3	13.2	Wf			
123961 S URSAE MAJORIS—						
	4281.6	8.5	Ch	4341.1	9.6	Jo
	4298.7	8.6	Ch	4342.2	9.7	Ly
	4305.8	8.8	L	4342.6	10.2	Ls
	4308.2	8.9	Cu	4343.	9.5	Ro
	4317.3	9.2	Wf	4344.2	10.5	Sg
	4317.9	9.5	Lp	4345.3	10.0	Wf
	4319.1	9.3	B	4346.2	10.6	Mh
	4319.2	9.4	Cu	4346.2	9.8	Ly
	4320.3	9.3	Wf	4346.9	10.2	Lp
	4322.2	9.3	Ly	4347.1	10.0	Al
	4322.	9.0	Ro	4348.1	10.0	Jo
	4323.1	9.4	Mh	4348.1	10.5	Jo
	4323.3	9.4	Wf	4348.3	10.2	Wf
	4323.6	9.6	Ls	4349.	10.9	Ro
	4324.6	9.6	Ls	4351.2	10.0	Cy
	4326.2	9.1	Sg	4351.2	10.0	Ly
	4327.3	9.5	Wf	4353.1	11.0	Jo
	4327.6	9.9	Ls	4353.2	10.9	Pt
	4329.1	9.0	Jo	4353.9	10.8	Lp
	4329.6	9.8	Ls	4355.2	10.5	Ly
	4330.1	9.5	Ly	4356.1	11.3	Jo
	4331.2	9.5	Lv	4358.2	[11.0	Gb

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
123961 S URSAE MAJORIS—Continued.						
	4331.2	9.8	Gb	4358.3	10.6	Wf
	4331.3	9.6	Wf	4359.8	11.1	Lp
	4331.9	9.6	Lp	4361.3	10.8	Sg
	4332.1	9.8	Ya	4362.1	10.5	Al
	4333.1	9.4	Jo	4362.3	10.6	Wf
	4333.2	9.8	Cy	4363.1	[11.6	Jo
	4337.3	9.8	Wf	4374.2	11.2	Wb
	4338.2	9.7	Ly	4378.2	11.2	Wb
	4339.2	9.8	Lv	4381.1	10.5	Al
	4339.9	10.2	Lp			
124204 RU VIRGINIS—						
	4322.1	10.9	B	4350.1	12.0	Cy
	4326.2	11.7	Cy	4353.2	12.2	Pt
	4340.2	11.7	Pt			
124606 U VIRGINIS—						
	4326.2	9.2	Cy	4350.1	9.8	Cy
	4340.2	9.9	Pt	4353.2	10.4	Pt
130212 RV VIRGINIS—						
	4317.3	13.3	Wf	4322.1	12.9	B
	4321.3	12.6	Wf	4324.2	12.5	Wf
131283 Y OCTANTIS—						
	4274.5	10.0	Bl	4315.4	7.8	Bl
	4281.7	9.4	Sm	4315.8	8.5	Sm
	4283.5	9.5	Bl	4322.8	8.5	Sm
	4288.8	9.2	Sm	4323.4	8.2	Bl
	4296.8	9.0	Sm	4327.8	8.7	Sm
	4306.4	8.2	Bl	4332.4	8.5	Bl
132202 V VIRGINIS—						
	4343.1	[13.2	B	4351.1	[12.4	Cy
132422 R HYDRAE—						
	4274.5	4.4	Bl	4314.5	5.5	Kd
	4274.8	4.5	Ch	4314.6	5.3	Ch
	4276.8	4.2	Sm	4315.4	5.3	Bl
	4281.7	4.5	Ch	4315.7	5.1	Sm
	4282.8	4.2	Sm	4318.5	5.2	Kd
	4285.6	4.5	Ch	4320.5	5.4	Kd
	4288.7	4.3	Sm	4322.8	5.3	Sm
	4289.6	4.6	Ch	4323.4	5.3	Bl
	4295.6	4.7	Ch	4325.7	5.3	Ch
	4296.8	4.4	Sm	4327.6	5.8	Ch
	4301.6	5.2	Kd	4329.8	5.8	Sm
	4302.6	5.0	Ch	4340.2	5.5	Pt
	4310.9	5.0	L	4347.5	6.7	Kd
	4306.4	4.8	Bl	4350.5	6.7	Kd
	4311.5	5.4	Kd	4353.5	6.8	Kd
	4312.5	5.3	Kd	4356.5	7.1	Kd
132706 S VIRGINIS—						
	4276.8	6.6	Sm	4323.3	7.9	Wb
	4282.6	6.7	Ch	4324.2	8.0	Wf
	4282.7	7.1	Sm	4326.6	7.9	Ch
	4288.7	7.1	Sm	4327.8	8.0	Sm
	4291.6	6.9	Ch	4329.3	8.2	Wf
	4296.7	7.1	Sm	4340.2	8.6	Pt
	4315.1	7.3	Gd	4347.2	9.0	Sg
	4315.7	7.8	Sm	4350.1	8.8	Wb
	4317.3	7.6	Wf	4350.1	8.8	Cy
	4321.1	7.9	Mh	4353.2	9.0	Pt
	4322.8	7.9	Sm	4361.2	9.2	Wb
	4323.2	8.1	Mh			
133155 RV CENTAURI—						
	4274.5	9.2	Bl	4315.4	8.8	Bl
	4283.5	9.5	Bl	4323.4	8.7	Bl
	4306.4	9.0	Bl	4332.4	8.5	Bl
133273 T URSAE MINORIS—						
	4317.3	13.3	Wf	4348.2	13.8	Lv
	4323.3	13.4	Wf	4350.3	14.0	Wf
	4329.3	13.5	Wf	4358.3	14.3	Wf
	4331.2	13.4	Lv	4381.1	[13.0	Du
	4344.3	14.0	Wf			
133633 T CENTAURI—						
	4274.5	7.9	Bl	4322.7	6.5	Ht
	4275.8	8.5	Ht	4323.4	6.0	Bl
	4281.8	8.6	Ht	4328.7	6.2	Ht
	4289.7	8.5	Ht	4347.5	7.0	Kd
	4296.7	8.0	Ht	4350.5	6.9	Kd
	4301.5	6.7	Kd	4315.5	6.9	Kd
	4306.5	6.8	Bl	4353.5	6.9	Kd
	4314.5	6.3	Kd	4356.5	7.0	Kd
	4318.5	6.0	Kd			
134236 RT CENTAURI—						
	4274.5	11.3	Bl	4323.4	12.4	Bl
	4306.5	11.8	Bl			
134440 R CANUM VENATICORUM—						
	4318.0	11.3	Lp	4346.2	10.4	Mh
	4321.0	11.0	Lp	4346.8	10.9	Lp
	4323.2	11.6	Mh	4353.2	10.3	Pt
	4325.2	11.0	B	4355.2	10.3	Cy
	4331.1	11.4	Lv	4359.8	10.3	Lp
	4332.1	10.8	Ya	4365.8	10.2	Lp
	4339.2	11.3	Lv	4373.1	10.0	Ly
	4339.9	11.0	Lp	4377.2	10.1	Ly
	4340.2	10.5	Pt			
134536 RX CENTAURI—						
	4323.5	[13.1	Bl			
134647 T APODIS—						
	4274.5	[13.2	Bl	4322.8	12.5	Sm
	4282.8	[12.7	Sm	4323.5	12.4	Bl
	4306.4	[12.7	Bl	4332.4	11.7	Bl
	4315.5	12.7	Bl			
135908 RR VIRGINIS—						
	4322.1	[13.5	B			
140113 Z BOOTIS—						
	4317.3	13.5	Wf	4343.3	13.9	Wf
	4323.3	13.5	Wf	4345.3	13.9	Wf
	4326.3	13.5	Wf	4346.3	14.0	Wf
	4329.3	13.8	Wf	4358.3	14.6	Wf
	4343.1	13.9	B			
140528 RU HYDRAE—						
	4274.5	9.3	Bl	4306.5	11.3	Bl
	4276.8	10.1	Sm	4315.7	12.2	Sm
	4282.7	10.7	Sm	4322.7	12.3	Sm
	4288.7	10.8	Sm	4323.5	12.2	Bl
	4296.7	11.2	Sm			
140959 R CENTAURI—						
	4274.5	5.6	Bl	4306.4	5.8	Bl
	4275.8	5.5	Ht	4315.5	6.2	Bl
	4276.8	5.4	Sm	4315.7	6.4	Sm
	4281.8	5.7	Ht	4322.7	6.5	Sm
	4282.7	5.3	Sm	4322.7	7.0	Ht
	4283.5	5.5	Bl	4323.5	6.6	Bl

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
140959 R CENTAURI—Continued.						
	4288.7	5.4	Sm	4328.7	6.8	Ht
	4289.7	6.0	Ht	4329.7	6.5	Sm
	4296.7	5.9	Sm	4332.4	7.3	Bl
	4296.7	6.0	Ht			
141567 U URSAE MINORIS—						
	4282.6	11.5	Ch	4355.2	11.6	Cy
	4326.6	11.8	Ch	4353.2	12.2	Pt
	4331.2	12.0	Lv	4354.2	11.5	Wb
	4339.2	12.0	Lv	4361.2	11.9	Lv
	4340.2	12.0	Pt	4381.1	11.5	Du
	4348.2	12.0	Lv			
141954 S BOOTIS—						
	4274.6	[10.6	Ch	4344.2	8.8	Sg
	4285.6	11.3	Ch	4344.3	8.4	Wf
	4304.6	10.4	Ch	4348.3	8.4	Wf
	4317.3	10.1	Wf	4349.1	8.9	Ya
	4317.6	10.1	Ch	4350.2	8.6	Cy
	4323.3	9.8	Wf	4351.2	8.6	Jo
	4324.1	9.8	B	4353.2	8.3	Pt
	4326.2	10.0	Sg	4355.2	8.4	Gb
	4327.3	10.0	Wf	4356.1	8.5	Jo
	4329.2	9.9	Cy	4358.3	8.3	Wf
	4329.2	9.5	Jo	4361.2	8.6	Sg
	4331.3	9.5	Gb	4362.3	8.3	Wf
	4331.3	9.6	Wf	4363.1	8.4	Jo
	4333.2	9.3	Jo	4374.1	8.5	Jo
	4337.3	9.0	Wf	4374.2	8.5	Gb
	4340.2	9.0	Pt	4378.2	8.6	Sg
	4342.1	8.8	Jo	4379.1	8.5	Jo
	4342.2	8.8	Gb			
142539 V BOOTIS—						
	4274.6	8.6	Ch	4347.1	11.0	Al
	4285.6	8.9	Ch	4349.	9.8	Ro
	4304.6	10.1	Ch	4349.8	10.6	Lp
	4306.8	10.0	L	4350.2	10.8	Cy
	4313.9	10.6	Lp	4353.2	10.8	Pt
	4317.9	10.8	Lp	4353.8	10.5	Lp
	4320.9	10.6	Lp	4356.2	10.7	Cy
	4322.	9.8	Ro	4356.8	10.4	Lp
	4323.2	10.2	Mh	4359.8	10.3	Lp
	4324.6	9.8	Lv	4360.1	10.0	Cy
	4325.1	10.7	B	4362.1	10.2	Al
	4327.6	10.1	Ls	4362.8	10.3	Lp
	4329.2	10.7	Cy	4364.1	9.9	Cy
	4329.6	10.4	Ls	4365.8	10.2	Lp
	4336.9	10.8	Lp	4371.1	9.7	Al
	4339.9	10.7	Lp	4373.2	10.1	Ly
	4340.2	11.0	Pt	4373.2	9.9	Sg
	4341.2	10.8	Cy	4374.2	10.0	Gb
	4342.6	10.7	Ls	4376.1	9.7	Du
	4343.	9.8	Ro	4377.2	9.7	Ly
	4344.8	10.7	Lp	4380.1	9.4	Du
	4346.2	10.5	Mh	4380.1	9.5	Jo
	4346.9	10.7	Lp	4386.1	9.1	Su
142584 R CAMELOPARDALIS—						
	4317.3	8.4	Wf	4345.3	8.7	Wf
	4318.0	8.2	Lp	4346.9	9.4	Lp
	4320.9	8.3	Lp	4347.2	9.1	Du
	4323.2	8.3	Du	4348.3	8.6	Wf
	4323.3	8.2	Wf	4350.9	9.0	Lp
142584 R CAMELOPARDALIS—Continued.						
	4324.2	8.3	B	4351.1	9.3	Du
	4326.1	8.3	Du	4352.1	9.3	Du
	4327.3	8.4	Wf	4355.2	10.0	Cy
	4329.3	8.3	Du	4358.2	10.0	Gb
	4331.3	8.6	Gb	4358.3	9.5	Wf
	4331.3	8.5	Wf	4359.9	9.8	Lp
	4332.1	8.6	Ya	4362.3	9.7	Wf
	4333.1	8.5	Du	4365.8	10.1	Lp
	4336.3	8.5	Br	4376.1	10.5	Du
	4337.3	8.5	Wf	4380.1	10.6	Du
	4344.1	8.8	Du			
143227 R BOOTIS—						
	4299.6	[11.3	Ch	4349.1	8.4	Ya
	4323.2	10.6	Mh	4350.2	8.0	Cy
	4326.3	10.0	Sg	4353.2	7.8	Pt
	4331.3	9.0	Gb	4355.2	8.0	Gb
	4332.2	9.2	Cy	4373.2	7.2	Sg
	4340.2	8.6	Pt	4374.2	7.5	Gb
	4342.2	8.6	Gb	4386.1	7.2	Su
	4345.3	8.6	Sg			
144918 U BOOTIS—						
	4313.1	10.0	Gd	4349.1	**11.0**	**Ya**
	4324.2	10.1	Cy	4350.2	10.8	Cy
	4333.2	10.3	Cy	4356.2	10.8	Cy
	4341.2	10.7	Cy	4360.1	11.1	Cy
145254 Y LUPI—						
	4274.5	10.8	Bl	4315.5	11.0	Bl
	4282.7	10.5	Sm	4315.7	11.0	Sm
	4283.5	10.8	Bl	4322.7	11.9	Sm
	4288.7	10.5	Sm	4323.6	11.6	Bl
	4296.7	10.5	Sm	4329.7	11.9	Sm
	4306.4	10.9	Bl			
145971 S APODIS—						
	4274.5	10.3	Bl	4315.5	10.0	Bl
	4281.7	10.1	Sm	4315.8	10.2	Sm
	4283.5	10.1	Bl	4322.8	10.4	Sm
	4288.8	10.2	Sm	4323.6	9.9	Bl
	4296.8	10.4	Sm	4330.9	10.4	Sm
	4306.4	10.0	Bl			
150018 RT LIBRAE—						
	4322.2	11.8	B	4353.2	9.1	Pt
	4340.2	9.5	Pt			
150519 T LIBRAE—						
	4343.1	13.0	B			
150605 Y LIBRAE—						
	4324.1	[12.6	B	4340.2	13.4	Pt
151520 S LIBRAE—						
	4282.7	9.1	Ch	4326.6	8.5	Ch
	4299.6	9.0	Ch	4340.2	8.5	Pt
	4302.6	8.8	Ch	4353.2	8.6	Pt
	4314.6	8.6	Ch			
151714 S SERPENTIS—						
	4318.3	12.8	Wf	4345.3	13.1	Wf
	4323.3	12.4	Wf	4350.2	12.5	Cy
	4329.3	12.6	Wf	4353.2	12.5	Pt
	4332.2	12.3	Cy	4358.3	12.1	Wf
	4340.2	12.4	Pt	4359.3	12.1	Wf
151731 S CORONAE BOREALIS—						
	4282.6	11.0	Ch	4341.2	12.5	Cy
	4315.6	[10.3	Ch	4344.3	12.9	Wf

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
151731 S CORONAE BOREALIS—Continued.						
	4317.3	12.4	Wf	4348.3	13.0	Wf
	4323.3	12.6	Wf	4353.2	12.2	Pt
	4326.3	12.1	Sg	4355.2	12.5	Cy
	4327.3	12.5	Wf	4358.3	13.0	Wf
	4331.3	12.6	Wf	4361.3	12.5	Wf
	4337.3	12.8	Wf	4361.3	[12.4	Sg
	4340.2	12.5	Pt	4378.2	[11.8	Sg
151822 RS LIBRAE—						
	4274.5	8.3	Bl	4306.4	8.5	Bl
	4275.8	7.7	Ht	4315.7	8.9	Sm
	4276.8	7.9	Sm	4322.7	9.7	Sm
	4281.8	7.7	Ht	4322.7	9.9	Ht
	4282.7	7.7	Sm	4323.6	9.6	Bl
	4288.8	7.7	Sm	4326.9	9.5	L
	4289.7	7.9	Ht	4327.7	9.8	Sm
	4296.8	8.3	Ht	4328.7	9.8	Ht
	4296.8	7.9	Sm			
152714 RY LIBRAE—						
	4340.2	13.0	Pt	4353.2	13.4	Pt
	4343.1	13.0	B			
152849 R NORMAE—						
	4274.5	8.1	Bl	4306.4	8.8	Bl
	4276.8	8.2	Sm	4315.5	9.5	Bl
	4282.7	8.5	Sm	4315.7	9.4	Sm
	4283.5	8.3	Bl	4322.7	9.6	Sm
	4288.7	8.7	Sm	4323.6	9.7	Bl
	4296.7	9.0	Sm	4327.7	9.8	Sm
153020 X LIBRAE—						
	4323.6	12.1	Bl			
153215 W LIBRAE—						
	4274.5	12.0	Bl	4323.6	[13.1	Bl
153378 S URSAE MINORIS—						
	4317.3	10.3	Wf	4344.2	11.0	Sg
	4321.1	10.7	Mh	4345.3	11.2	Wf
	4322.	10.5	Ro	4348.3	11.4	Wf
	4323.1	10.6	Mh	4349.	10.8	Ro
	4323.3	10.3	Wf	4353.2	10.9	Pt
	4324.3	10.6	Cy	4358.3	11.6	Wf
	4326.2	10.7	Sg	4362.3	11.6	Wf
	4327.3	10.6	Wf	4373.2	11.8	Sg
	4331.3	10.8	Wf	4375.1	11.9	Du
	4337.3	10.8	Wf	4376.1	12.0	Du
	4340.2	10.8	Pt	4380.0	12.0	Du
	4343.	10.6	Ro	4387.1	[12.5	Su
153630a U LIBRAE—						
	4323.6	[12.9	Bl			
153654 T NORMAE—						
	4275.8	10.8	Ht	4296.7	12.2	Sm
	4281.7	10.8	Sm	4296.8	12.2	Ht
	4281.8	11.1	Ht	4322.7	12.8	Ht
	4288.7	11.8	Sm	4228.7	12.8	Ht
	4289.7	11.8	Ht			
154020 Z LIBRAE—						
	4323.6	[12.7	Bl			
154428 R CORONAE BOREALIS—						
	4274.7	6.1	Ch	4344.2	6.1	Cy
	4282.7	6.1	Ch	4344.3	6.2	Wf
	4283.6	6.1	Ch	4345.2	6.3	Hy
	4284.6	6.1	Ch	4345.2	6.1	Pt
	4285.7	6.1	Ch	4345.3	6.0	Sg
	4286.6	6.1	Ch	4345.3	6.2	Wf
	4287.6	6.2	Ch	4345.9	6.3	Kl
	4289.7	6.1	Ch	4346.2	6.0	Ly
	4291.7	6.1	Ch	4346.2	6.4	Mh
	4285.6	6.1	Ch	4347.1	6.2	Al
	4298.7	6.1	Ch	4347.1	6.0	Cu
	4299.6	6.1	Ch	4347.2	6.1	Pt
	4301.6	6.0	Du	4347.5	6.2	Kd
	4302.6	6.0	Ch	4348.2	6.0	Pj
	4303.7	6.0	Ch	4348.2	6.2	Pt
	4310.9	5.9	L	4348.2	6.1	Cy
	4311.5	6.2	Kd	4349.2	6.2	Pt
	4313.9	6.0	L	4349.	5.8	Ro
	4313.2	6.5	Pj	4349.5	6.2	Kd
	4314.5	6.2	Kd	4350.2	6.1	Cy
	4314.6	6.1	Ch	4350.2	6.2	Pt
	4317.3	6.0	Wf	4350.2	6.0	Wb
	4318.3	6.0	Wf	4350.2	6.0	Pj
	4318.5	6.0	Kd	4350.6	6.0	Mm
	4320.2	6.0	Pj	4351.1	5.9	Jo
	4320.3	6.0	Wf	4351.1	6.0	Cm
	4321.1	6.2	Pt	4351.1	5.8	Pj
	4321.2	6.0	Pj	4351.2	6.0	Ly
	4321.3	6.0	Wf	4351.2	6.0	Cy
	4322.2	6.1	Ly	4352.2	6.0	Cy
	4322.2	6.1	Cy	4353.2	6.2	Pt
	4322.3	6.2	Pt	4353.5	6.1	Kd
	4322.	6.0	Ro	4354.2	6.2	Pt
	4323.2	6.5	Mh	4355.1	6.1	L
	4323.3	6.1	Wf	4355.2	6.1	Cy
	4323.3	6.2	Pt	4355.2	6.0	Gb
	4324.2	6.1	Cy	4355.2	6.2	Pt
	4324.4	6.0	Wf	4356.1	6.0	Jo
	4325.2	6.1	Pj	4356.2	6.0	Cy
	4325.8	6.1	Ch	4356.2	6.2	Pt
	4326.2	6.1	Cy	4357.1	6.0	Cy
	4326.2	6.2	Ie	4357.1	6.0	Cm
	4326.4	6.1	Wf	4358.2	6.2	Pt
	4326.9	6.0	L	4359.1	6.0	Cy
	4327.3	6.0	Wf	4359.2	6.1	Pt
	4327.6	5.7	Ls	4359.3	6.1	Wf
	4328.3	6.2	Pt	4360.1	6.0	Cy
	4328.7	6.1	Kd	4360.2	6.1	Pt
	4329.1	6.0	Jo	4361.1	6.0	Sg
	4329.1	6.1	Cm	4361.2	6.0	Ly
	4329.1	6.0	Ks	4361.2	6.2	Pt
	4329.2	6.1	Cy	4362.1	6.0	Cy
	4329.2	6.1	Pt	4362.2	5.8	Pj
	4329.4	6.1	Wf	4363.1	6.0	Du
	4329.6	5.4	Ls	4363.2	5.9	Jo
	4330.2	6.2	Pj	4364.1	6.0	Cy
	4330.3	6.0	Wf	4365.1	6.0	Cy
	4331.2	6.2	Pt	4365.2	6.2	Pt
	4331.2	6.0	Ly	4366.1	6.0	Cy
	4332.1	6.0	Ya	4366.2	6.2	Pt
	4333.2	6.0	Cy	4368.2	6.2	Pt
	4333.2	6.2	Ie	4369.2	6.1	Pt
	4333.2	5.9	Jo	4369.2	6.0	Ly
	4333.2	6.0	Sg	4371.1	6.2	Al
	4333.2	6.2	Pt	4372.2	6.2	Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
154428 R CORONAE BOREALIS—Continued.						
	4333.2	6.0	Cy	4373.2	6.0	Ly
	4333.2	5.9	Pj	4373.2	6.0	Sg
	4335.2	6.2	Pt	4373.2	6.1	Pt
	4336.2	6.0	Cy	4374.1	6.0	Cm
	4337.2	6.2	Pt	4374.1	6.0	Jo
	4337.3	6.1	Wf	4374.2	6.0	Gb
	4338.2	6.0	Ly	4375.1	6.0	Du
	4338.2	6.2	Pt	4376.1	6.1	Du
	4339.2	5.8	Pj	4376.1	5.9	Ks
	4340.2	6.2	Pt	4376.2	6.2	Pt
	4341.2	6.1	Cy	4377.1	5.9	Ly
	4341.6	6.0	Ls	4377.2	6.2	Pt
	4342.2	6.0	Jo	4378.2	6.2	Sg
	4342.2	6.0	Ly	4379.1	6.0	Cm
	4342.2	6.2	Pt	4379.1	6.1	Du
	4342.2	6.0	Ks	4379.2	6.2	Pt
	4342.6	6.2	Ls	4380.1	6.0	Du
	4343.3	6.2	Wf	4380.1	6.4	Hb
	4343.3	6.2	Pt	4380.1	6.0	Ly
	4344.2	6.2	Pt	4380.2	6.2	Pt
	4344.2	6.0	Jo	4381.1	6.1	Du
	4344.2	6.1	Cm	4381.1	6.2	Al
	4344.2	6.1	Ly	4382.1	6.1	Du
	4344.2	6.0	Sg	4386.1	6.0	Cm
	4344.2	6.1	Du	4386.2	6.2	Su
154536 X CORONAE BOREALIS—						
	4318.3	13.2	Wf	4340.2	12.5	Pt
	4323.3	13.1	Wf	4348.3	12.0	Wf
	4324.2	12.4	Cy	4351.2	11.1	Cy
	4329.3	12.8	Wf	4353.2	11.3	Pt
	4333.2	12.5	Cy	4359.3	11.4	Wf
	4338.3	13.3	Wf	4362.1	10.5	Cy
154615 S SERPENTIS—						
	4281.7	8.9	Ch	4340.2	11.1	Pt
	4299.6	9.7	Ch	4345.3	11.5	Sg
	4313.9	10.7	Lp	4350.8	11.6	Lp
	4315.6	10.5	Ch	4351.2	10.8	Cy
	4318.0	10.0	Lp	4353.2	11.2	Pt
	4323.2	10.8	Mh	4359.8	12.1	Lp
	4327.3	10.3	Sg	4362.3	[11.6	Sg
	4333.2	11.2	Cy			
154639 V CORONAE BOREALIS—						
	4318.3	9.9	Wf	4340.2	8.6	Pt
	4323.3	9.9	Wf	4345.3	9.5	Wf
	4329.3	9.9	Wf	4353.2	8.3	Pt
	4333.2	9.5	Cy	4359.3	8.9	Wf
	4338.3	9.2	Wf	4362.1	9.7	Cy
154715 R LIBRAE—						
	4325.1	[12.1	B			
155018 RR LIBRAE—						
	4316.4	11.4	Ch	4340.2	8.6	Pt
	4326.6	9.8	Ch	4353.2	8.5	Pt
155229 Z CORONAE BOREALIS—						
	4333.2	[12.3	Cy	4362.2	12.0	Cy
	4351.2	[12.5	Cy			
155823 RZ SCORPII—						
	4275.8	8.9	Ht	4314.7	11.6	Sm
	4281.8	8.9	Ht	4322.7	12.0	Ht
	4282.7	9.1	Sm	4322.7	12.0	Sm
	4288.8	9.3	Sm	4327.7	12.0	Sm
155823 RZ SCORPII—Continued.						
	4289.8	9.3	Ht	4328.7	12.2	Ht
	4296.8	9.3	Ht	4345.2	12.4	Pt
	4296.8	10.0	Sm	4353.2	12.5	Pt
160021 Z SCORPII—						
	4274.5	12.0	Bl	4314.7	[11.7	Sm
	4282.8	[11.8	Sm	4323.6	12.0	Bl
	4288.8	[12.0	Sm			
160118 R HERCULIS—						
	4282.6	[10.7	Ch	4353.6	[11.0	Mm
	4315.6	[10.7	Ch	4362.2	[12.4	Sg
	4345.3	[12.4	Sg			
160210 Y SERPENTIS—						
	4317.2	11.5	Pj	4345.2	12.5	Pt
	4321.3	11.6	Pj	4351.2	13.0	Cy
	4324.2	11.6	Cy	4353.2	12.6	Pt
	4325.2	11.5	Pj	4376.1	[12.5	Du
	4327.3	11.8	Sg	4380.1	[12.6	Du
160221a X SCORPII—						
	4274.5	12.1	Bl	4323.6	10.7	Bl
160325 SX HERCULIS—						
	4313.9	8.5	L	4355.2	7.8	Pt
	4317.3	9.1	Wf	4356.2	7.8	Pt
	4318.3	8.4	Wf	4358.3	7.9	Wf
	4320.3	8.2	Wf	4359.2	8.0	Pt
	4321.3	8.3	Wf	4359.3	8.0	Wf
	4323.3	8.2	Wf	4360.2	8.0	Pt
	4324.3	8.2	Wf	4361.2	7.9	Pt
	4326.9	8.1	L	4362.3	8.0	Wf
	4329.3	8.3	Wf	4366.2	8.1	Pt
	4330.3	8.0	Wf	4367.2	8.0	Pt
	4337.3	7.8	Wf	4368.2	8.2	Pt
	4338.3	7.8	Wf	4369.2	8.1	Pt
	4343.3	7.9	Wf	4372.2	8.1	Pt
	4344.3	7.9	Wf	4373.2	8.0	Pt
	4348.3	7.8	Wf	4376.2	8.0	Pt
	4353.2	7.7	Pt	4377.2	8.1	Pt
	4354.2	7.7	Pt	4379.2	8.1	Pt
	4355.1	8.2	L	4380.2	8.0	Pt
160519 W SCORPII—						
	4323.6	12.7	Bl			
160625 RU HERCULIS—						
	4317.3	13.8	Wf	4344.3	13.3	Wf
	4323.3	13.6	Wf	4348.3	13.2	Wf
	4324.3	13.2	Cy	4353.2	13.1	Pt
	4325.1	12.0	Ya	4358.3	12.9	Wf
	4329.3	13.4	Wf	4369.2	[12.3	Cy
	4338.3	13.4	Wf	4362.3	13.1	Wf
161122a R SCORPII—						
	4282.8	[11.8	Sm	4322.7	10.2	Sm
	4288.8	[12.0	Sm	4323.6	10.1	Bl
	4314.7	10.7	Sm	4327.7	10.5	Sm
	4315.7	10.5	Sm	4354.2	9.9	Pt
	4322.3	9.6	Pt			
161122b S SCORPII—						
	4282.8	[12.2	Sm	4323.6	[12.6	Bl
	4288.8	[12.6	Sm	4354.2	12.4	Pt
	4315.2	[11.9	Sm			
161138 W CORONAE BOREALIS—						
	4317.3	13.3	Wf	4344.3	11.9	Wf
	4323.3	13.3	Wf	4348.3	12.0	Wf

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
161138 W Cor. Bor.—Continued.						
	4325.1	[11.2	Ya	4354.2	11.8	Pt
	4327.3	12.9	Wf	4358.3	11.2	Wf
	4337.3	12.4	Wf	4361.3	11.3	Wf
161607 W Ophiuchi—						
	4284.7	[11.4	Ch	4314.6	[11.8	Ch
162112 V Ophiuchi—						
	4322.3	9.7	Pt	4354.2	9.8	Pt
	4325.1	10.0	Ya			
162119 U Herculis—						
	4281.7	8.6	Ch	4347.2	[12.7	Sg
	4290.9	8.2	Kl	4348.3	8.8	Wf
	4295.6	8.1	Ch	4351.1	8.8	Cm
	4302.6	8.0	Ch	4351.1	8.4	Ya
	4317.3	7.9	Wf	4351.9	9.0	Kl
	4322.3	7.5	Pt	4353.2	8.4	Jo
	4323.3	8.0	Wf	4354.2	8.6	Pt
	4325.1	8.4	Ya	4356.2	8.4	Jo
	4327.3	8.4	Wf	4358.3	9.2	Wf
	4329.1	8.2	Jo	4361.3	9.3	Wf
	4329.1	8.5	Cm	4362.2	9.3	Sg
	4337.3	8.5	Wf	4363.1	8.5	Jo
	4342.1	7.6	Jo	4374.1	9.0	Jo
	4344.2	8.7	Cm	4379.1	9.5	Jo
	4344.3	8.6	Wf	4379.1	9.5	Cm
	4345.3	8.7	Sg	4386.2	10.0	Sm
	4345.9	8.6	Kl			
162807 SS Herculis—						
	4306.9	9.9	L	4354.2	13.0	Pt
	4322.3	11.8	Pt	4360.2	[12.1	Cy
	4325.1	11.8	Ya	4381.1	10.5	Jo
162815 T Ophiuchi—						
	4274.5	9.8	Bl	4323.6	12.2	Bl
	4322.3	12.0	Pt			
162816 S Ophiuchi—						
	4274.5	9.7	Bl	4323.6	10.9	Pl
	4313.9	10.6	L			
163137 W Herculis—						
	4275.6	11.0	Ch	4314.6	8.4	Ch
	4281.7	9.5	Ch	4322.3	8.5	Pt
	4289.7	9.0	Ch	4354.2	9.5	Pt
	4300.6	8.4	Ch			
163172 R Ursae Minoris—						
	4321.0	9.6	Lp	4356.9	10.1	Lp
	4340.0	9.8	Lp	4359.9	10.1	Lp
	4244.9	9.8	Lp			
163266 R Draconis—						
	4282.0	[11.0	Ch	4350.9	8.0	Lp
	4313.9	10.8	Lp	4354.2	8.0	Pt
	4317.9	10.6	Lp	4356.9	8.0	Lp
	4320.9	10.6	Lp	4357.1	8.0	Jo
	4322.3	10.6	Pt	4359.9	7.9	Lp
	4325.1	10.5	Ya	4362.8	7.9	Lp
	4325.7	10.2	Ch	4365.8	7.9	Lp
	4336.3	9.3	Br	4375.2	8.1	Jo
	4340.0	9.4	Lp	4379.2	8.0	Jo
	4344.9	8.1	Lp	4381.2	8.0	Jo
164319 RR Ophiuchi—						
	4288.8	[12.0	Sm	4327.7	[12.0	Sm
	4315.8	[11.7	Sm	4354.2	13.1	Pt
	4322.3	13.2	Pt			
164715 S Herculis—						
	4281.7	8.4	Ch	4354.2	9.3	Pt
	4315.6	8.3	Ch	4356.2	9.0	Jo
	4322.3	8.1	Pt	4363.2	8.8	Jo
	4325.1	8.5	Ya	4381.1	9.6	Jo
164844 RS Scorpii—						
	4274.5	6.9	Bl	4306.4	7.6	Bl
	4275.8	7.2	Ht	4314.8	7.9	Sm
	4281.8	7.2	Ht	4315.5	8.0	Bl
	4289.7	7.4	Ht	4324.5	8.4	Bl
	4296.8	7.8	Ht	4322.7	8.4	Ht
	4276.8	7.0	Sm	4322.7	8.2	Sm
	4282.8	7.3	Sm	4327.7	8.8	Sm
	4288.8	7.3	Sm	4328.7	9.0	Ht
	4296.8	7.5	Sm			
165030 RR Scorpii—						
	4274.5	7.5	Bl	4315.5	9.7	Bl
	4306.4	8.7	Bl	4324.5	10.4	Bl
165202 SS Ophiuchi—						
	4322.3	9.0	Pt	4354.2	8.9	Pt
165631 RV Herculis—						
	4323.2	14.0	Bi	4354.2	14.8	Pt
	4331.2	[13.9	Lv	4373.2	12.2	Sg
	4342.2	14.1	Lv	4378.2	11.1	Bi
	4346.3	14.1	Lv			
165636 RT Scorpii—						
	4324.5	[13.0	Bl			
170215 R Ophiuchi—						
	4275.6	8.1	Ch	4342.2	8.9	Ks
	4284.7	7.9	Ch	4345.1	9.6	Cm
	4298.7	7.8	Ch	4346.2	9 3	Ly
	4321.1	8.4	Mh	4346.2	9.6	Mh
	4322.2	8.4	Ly	4348.3	9.3	Pj
	4322.3	8.0	Pt	4350.2	9.6	Wb
	4323.2	8.7	Mh	4351.1	8 7	Jo
	4324.1	8.7	B	4351.2	9.8	Ly
	4324.7	8.4	Ch	4351.2	9.4	Cm
	4325.1	8.5	Ya	4351.2	9.0	Pj
	4329.1	8.6	Jo	4351.3	9 4	Cy
	4329.1	8.4	Cm	4351.6	9.8	Mm
	4330.1	8.6	Ly	4354.2	9.6	Pt
	4333.2	8.7	Ie	4355.2	10.0	Ly
	4333.2	8.8	Cy	4356.1	10.5	Io
	4342.1	8.6	Jo	4357.1	10.6	Jo
	4342.2	9.2	Ly	4360.2	9.9	Wb
170627 RT Herculis—						
	4318.3	12.6	Wf	4343.3	13.2	Wf
	4322.3	12.7	Pt	4350.3	13.7	Wf
	4323.4	12.8	Wf	4354.2	13.5	Pt
	4329.3	12.8	Wf	4358.3	14.0	Wf
170833 RW Scorpii—						
	4274.5	11.6	Bl	4315.5	10.9	Bl
	4306.5	10.6	Bl	4324.5	10.9	Bl
171401 Z Ophiuchi—						
	4345.2	12.5	Pt	4354.2	11.9	Pt
171723 RS Herculis—						
	4318.3	9.2	Wf	4345.2	10.7	Pt
	4323.4	9.4	Wf	4345.3	10.8	Wf
	4329.3	9.7	Wf	4354.2	10 8	Wf
	4338.3	10.3	Wf	4359.3	11.0	Wf

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
172486 S OCTANTIS—						
	4282.7	[12.1	Ht	4322.7	[12.1	Ht
	4289.8	[12.8	Ht	4324.5	[13.0	Bl
	4296.8	[12.8	Ht	4328.7	[12.8	Ht
172809 RU OPHIUCHI—						
	4345.2	13.4	Pt	4354.2	13.7	Pt
173543 RU SCORPII—						
	4274.5	12.0	Bl	4315.5	11.0	Bl
	4306.5	11.5	Bl	4324.5	11.0	Bl
174135 SV SCORPII—						
	4274.6	10.7	Bl	4324.5	[12.5	Bl
174162 W PAVONIS—						
	4274.5	9.9	Bl	4306.5	11.5	Bl
	4275.8	10.1	Ht	4315.5	12.2	Bl
	4281.8	10.1	Ht	4322.8	[12.3	Ht
	4289.8	10.6	Ht	4328.7	[12 3	Ht
	4300.9	11.3	Ht			
174406 RS OPHIUCHI—						
	4345.2	11.0	Pt	4354.2	11.1	Pt
174551 U ARAE—						
	4276.8	9.2	Sm	4314.8	9.0	Sm
	4282.8	8.4	Sm	4322.7	8.6	Sm
	4288.8	8.4	Sm	4327.7	8.6	Sm
	4296.8	8.4	Sm			
175111 RT OPHIUCHI—						
	4345.2	10.4	Pt	4354.2	10.2	Pt
175458a T DRACONIS—						
	4325.1	11.0	B	4343.3	13.1	Wf
	4326.4	13.0	Wf	4348.3	13.4	Wf
	4327.3	13.1	Wf	4358.3	13.1	Wf
	4330.3	12.9	Wf			
175458b UY DRACONIS—						
	4326.3	10.8	Wf	4348.3	11.2	Wf
	4330.3	10.9	Wf	4358.3	11.0	Wf
	4343.3	11.0	Wf			
175519 RY HERCULIS—						
	4323.2	13.7	Bi	4353.3	11.7	Bi
	4331.2	13.5	Lv	4354.2	11.8	Pt
	4343.2	12.9	Lv	4361.2	11.2	Lv
	4345.2	12.4	Pt	4378.2	10.0	Bi
	4347.2	12.0	Lv			
175654 V DRACONIS—						
	4354.2	11.2	Pt			
180363 R PAVONIS—						
	4275.8	9.3	Ht	4300.9	8.3	Ht
	4276.8	8.7	Sm	4315.8	8.4	Sm
	4282.7	8.3	Sm	4322.8	8.4	Ht
	4282.9	8.3	Ht	4327.7	8.4	Sm
	4288.8	8 3	Sm	4327.7	8.5	Sm
	4289.8	8.1	Ht	4328.7	8.7	Ht
	4296.8	8.3	Sm			
180531 T HERCULIS—						
	4313.9	10.1	Lp	4346.9	8.5	Lp
	4314.6	10.8	Ch	4348.3	8.7	Wf
	4317.3	10.1	Wf	4349.8	8 3	Lp
	4317.9	10.1	Lp	4351.2	8.6	Ly
	4320.3	9.6	Wf	4351.2	8.8	Cm
	4320.9	9.7	Lp	4354.2	8.5	Pt
	4322.2	9.5	Ly	4355.1	8.5	L
	4324.3	9.5	Wf	4355.2	8.5	Ly
	4325.1	9.3	Ya	4356.8	8.3	Lp

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
180531 T HERCULIS—Continued.						
	4328.3	9.4	Wf	4358.2	8.6	Jo
	4330.1	9.4	Ly	4358.3	8.6	Wf
	4332.0	9.0	Lp	4358.3	8.3	Br
	4336.1	9.2	Cu	4358.8	8.3	Lp
	4336.9	8.8	Lp	4360.2	7.5	Wf
	4337.3	9.3	Wf	4362.8	8.2	Lp
	4340.0	8.6	Lp	4365.8	8.2	Lp
	4342.2	8.9	Ly	4373.2	8.7	Ly
	4343.0	8.5	Lp	4377.2	8.7	Ly
	4344.2	9.0	Cm	4379.2	9.0	Cm
	4344.3	9.4	Wf	4381.1	9.2	Al
	4344.8	8.8	Lp	4381.2	8.9	Jo
	4345.2	8.8	Pt	4386.2	9.2	Su
	4346.2	8.7	Sg			
180565 W DRACONIS—						
	4323.3	10.4	Bi	4354.2	11.8	Pt
	4333.1	11.0	Du	4361.2	12.3	Lv
	4334.1	10.8	Bi	4375.2	12.3	Du
	4342.3	11.3	Bi	4378.3	13.1	Bi
	4345.2	11.5	Pt	4381.1	12.4	Du
	4348.2	11.6	Lv			
180666 X DRACONIS—						
	4323.3	13.2	Bi	4354.2	11.2	Pt
	4334.1	12.5	Bi	4361.2	11.4	Lv
	4342.3	12.4	Bi	4375.2	11.8	Du
	4345.2	11.1	Pt	4381.1	12.0	Du
	4348.2	11.2	Lv			
180911 NOVA OPHIUCHI—						
	4354.2	[12.6	Pt			
181103 RY OPHIUCHI—						
	4317.3	9.4	Wf	4345.2	12.4	Pt
	4320.3	9.7	Wf	4347.2	12.6	Lv
	4323.2	9.6	Br	4348.3	12.6	Wf
	4324.3	9.6	Cy	4351.2	12.6	Lv
	4324.3	10.0	Wf	4353.3	13.3	Bi
	4328.3	10.4	Wf	4354.2	13.2	Pt
	4330.2	10.2	Br	4358.3	13.4	Wf
	4331.2	10.8	Lv	4360.2	13.6	Wf
	4334.1	10.9	Br	4361.2	13.7	Lv
	4337.3	11.8	Wf	4378.2	13.8	Bi
	4342.2	12.1	Lv	4381.1	10.0	Jo
	4344.3	12.3	Wf			
181136 W LYRAE—						
	4317.2	12.3	Wf	4345.2	10.5	Pt
	4320.3	12.2	Wf	4348.3	11.1	Wf
	4321.3	12.3	Wf	4354.2	10.8	Pt
	4324.3	12.1	Wf	4358.3	10.5	Wf
	4326.9	12.5	L	4360.2	10.4	Wf
	4328.3	12.1	Wf	4380.1	9.7	Al
	4337.3	12.0	Wf	4380.1	9.4	Du
	4344.3	11.6	Wf	4381.2	9.4	Jo
182133 RV SAGITTARII—						
	4274.6	11.0	Bl	4324.5	13.1	Bl
	4306.5	12.3	Bl			
182224 SV HERCULIS—						
	4258.3	11.0	Br			
183308 X OPHIUCHI—						
	4322.2	8.8	Ly	4351.2	8.8	Cy
	4324.3	9.0	Cy	4351.6	9.0	Mm
	4325.1	8.7	B	4353.2	8.5	Jo

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
183308 X OPHIUCHI—Continued.						
	4326.9	8.5	L	4354.2	8.6	Pt
	4329.2	8.6	Jo	4355.2	8.5	Ly
	4330.2	8.8	Ly	4357.2	8.4	Jo
	4333.3	8.8	Cy	4360.1	8.4	Cy
	4336.1	8.7	Cu	4363.1	8.4	Jo
	4342.2	8.4	Jo	4369.1	8.6	Ly
	4342.2	8.7	Ly	4373.2	8.5	Ly
	4344.2	9.0	Wb	4377.2	8.7	Ly
	4345.2	8.4	Pt	4379.1	8.0	Jo
	4346.2	8.6	Ly	4380.1	7.9	Al
	4347.3	9.0	Wb	4380.1	8.4	Du
	4350.2	9.0	Wb	4380.3	8.7	Wb
	4351.1	8.1	Jo			
184134 RY LYRAE—						
	4333.1	[13.3	Ie			
184205 R SCUTI—						
	4285.7	6.1	Ch	4351.2	5.5	Cy
	4301.6	6.8	Kd	4351.2	5.5	Ly
	4310.5	5.8	Kd	4351.6	5.0	Kd
	4314.5	6.2	Kd	4352.2	5.3	Cy
	4321.1	5.6	Mh	4352.5	4.9	Kd
	4321.1	6.0	Pt	4353.1	5.0	Jo
	4322.2	5.7	Cy	4353.2	5.2	Pt
	4322.	6.0	Ro	4353.5	4.9	Kd
	4322.3	6.0	Pt	4353.6	5.0	Mm
	4323.2	5.5	Mh	4354.2	5.4	Pt
	4323.3	5.8	Gb	4355.1	5.0	L
	4323.3	6.0	Pt	4355.2	5.0	Cy
	4324.2	5.5	Cy	4355.2	5.8	Gb
	4324.7	6.1	Ch	4355.2	5.5	Ly
	4325.2	5.3	Ya	4355.2	5.4	Pt
	4326.1	5.7	Ie	4356.2	5.5	Cy
	4326.2	5.5	Cy	4356.2	5.2	Pt
	4326.3	5.5	Sg	4357.1	5.5	Cy
	4328.3	5.6	Pt	4357.1	5.3	Jo
	4328.7	5.5	Kd	4357.5	4.8	Kd
	4329.1	5.5	Ks	4358.2	5.4	Pt
	4329.1	5.0	Jo	4359.1	5.0	Cy
	4329.2	5.7	Pt	4359.2	5.3	Pt
	4329.2	5.5	Cy	4360.1	5.0	Cy
	4329.1	5.6	Cm	4360.2	5.3	Pt
	4331.2	5.9	Pt	4361.1	5.0	Cy
	4333.1	5.5	Cu	4361.2	5.3	Pt
	4333.1	5.5	Ie	4362.1	5.2	Du
	4333.2	5.5	Cy	4362.2	5.0	Cy
	4333.2	5.5	Pt	4363.1	5.1	Du
	4335.2	5.3	Cy	4363.2	4.8	Jo
	4335.3	5.5	Pt	4364.1	5.0	Cy
	4336.1	5.6	Cu	4365.1	5.0	Cy
	4338.2	5.0	Pt	4365.2	5.3	Pt
	4340.2	5.3	Pt	4366.1	5.0	Cy
	4341.2	5.0	Cy	4366.2	5.3	Cy
	4342.2	5.0	Jo	4367.2	5.3	Pt
	4342.2	5.8	Gb	4368.2	5.2	Pt
	4342.2	5.5	Ks	4369.2	5.5	Pt
	4342.2	5.5	Ly	4371.2	5.3	Pt
	4342.3	5.3	Pt	4372.1	5.3	Du
	4343.	5.8	Ro	4372.2	5.3	Pt
	4343.2	5.4	Ly	4373.1	5.8	Ly
	4343.3	5.8	Pt	4373.2	5.3	Pt
184205 R SCUTI—Continued.						
	4344.2	5.2	Jo	4373.2	5.6	Sg
	4344.2	5.5	Pt	4374.1	5.6	Cm
	4344.2	5.0	Cy	4374.2	5.8	Gb
	4344.2	5.1	Cm	4375.0	5.4	Du
	4344.2	5.7	Ly	4376.1	5.7	Ks
	4345.2	5.4	Pt	4376.2	5.4	Pt
	4345.2	5.0	Cy	4376.1	5.4	Du
	4345.2	5.0	Hy	4377.2	5.8	Ly
	4345.3	5.4	Sg	4377.2	5.3	Pt
	4346.2	5.5	Mh	4379.1	5.7	Cm
	4346.2	5.5	Ly	4379.1	5.3	Du
	4347.1	5.1	Cu	4379.2	5.0	Jo
	4347.2	5.5	Pt	4379.2	5.5	Pt
	4347.5	5.3	Kd	4380.0	5.4	Du
	4348.2	5.3	Pt	4380.1	4.5	Hb
	4348.5	5.2	Kd	4381.1	5.3	Du
	4349.	5.6	Ro	4382.0	5.4	Du
	4349.2	5.3	Pt	4386.1	5.0	Ly
	4349.7	5.1	Kd	4386.1	5.6	Cm
	4350.2	5.5	Cy	4386.2	5.4	Su
	4350.5	5.0	Kd	4387.1	5.0	Su
	4351.1	5.1	Cm			
184300 NOVA AQUILAE No. 3—						
	4285.8	10.3	Ch	4345.2	11.0	Pt
	4321.1	10.9	Pt	4345.3	10.6	Sg
	4322.	10.9	Ro	4347.2	10.9	Pt
	4326.6	10.3	Ch	4349.	10.5	Ro
	4328.3	10.7	Pt	4353.2	10.9	Pt
	4331.2	10.9	Pt	4373.2	10.7	Sg
	4340.2	11.0	Pt	4373.2	10.8	Pt
	4343.	10.6	Ro	4379.2	10.5	Pt
185032 RX LYRAE—						
	4285.7	[12.5	Ch			
185437a S CORONAE AUSTRALIS—						
	4274.5	12.0	Bl	4324.5	11.6	Bl
	4315.5	11.5	Bl			
185512a ST SAGITTARII—						
	4285.7	10.0	Ch	4326.7	[11.2	Ch
185537a R CORONAE AUSTRALIS—						
	4274.5	11.5	Bl	4324.5	12.1	Bl
	4315.5	12.5	Bl			
185537b T CORONAE AUSTRALIS—						
	4315.5	[12.5	Bl	4324.5	[12.5	Bl
185737 RT LYRAE—						
	4285.7	[12.0	Ch	4327.6	[11.0	Ch
190108 R AQUILAE—						
	4286.7	9.0	Ch	4345.2	11.2	Pt
	4318.0	10.9	Lp	4346.8	11.1	Lp
	4326.6	11.2	Ch	4354.2	11.1	Pt
	4343.0	11.1	Lp	4358.8	11.1	Lp
190529a V LYRAE—						
	4344.2	10.2	Br	4354.2	10.0	Pt
	4345.2	9.4	Pt	4362.2	10 9	Br
190818 RX SAGITTARII—						
	4286.8	[11.1	Ch	4326.7	[11.1	Ch
	4286.8	10.9	Ch			
190819a RW SAGITTARII—						
	4345.2	9.1	Pt	4354.2	9.0	Pt
	4326.7	10.0	Ch			

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
190917 TY AQUILAE—						
	4345.2	10.7	Pt	4354.2	10.8	Pt
190925 S LYRAE—						
	4331.2	[13.8	Lv	4350.2	[13.1	Br
	4342.3	[14.0	Lv	4358.2	[13.1	Br
	4344.2	[13.1	Br	4370.2	[13.1	Br
	4347.2	[13.1	Br	4378.2	[14.0	Bi
190926 X LYRAE—						
	4345.2	9.0	Pt	4354.2	9.0	Pt
190933a RS LYRAE—						
	4285.7	11.2	Ch	4346.3	14.0	Lv
	4330.3	13.2	Bi	4348.2	14.2	Br
	4334.2	13.7	Bi	4353.3	13.9	Bi
	4344.7	[13.4	Br			
190941 RU LYRAE—						
	4344.3	[12.6	Br	4370.2	[12.6	Br
	4358.3	[12.6	Br			
190967a U DRACONIS—						
	4325.7	10.2	Ch	4347.2	9.4	Du
	4333.1	9.8	Du	4351.1	9.6	Du
	4336.3	9.7	Br	4354.2	9.9	Pt
	4338.1	9.8	Du	4375.2	10.1	Du
	4345.2	10.0	Pt	4381.1	10.7	Du
191007 W AQUILAE—						
	4286.8	[11.0	Ch	4351.3	8.0	Br
	4326.7	10.8	Ch	4354.2	7.8	Pt
	4345.2	8.5	Pt			
191017 T AQUILAE—						
	4286.8	10.0	Ch	4326.7	9.0	Ch
	4302.7	9.6	Ch	4345.2	8.5	Pt
	4317.7	9.2	Ch	4354.2	7.6	Pt
191019 R SAGITTARII—						
	4277.9	7.0	Ch	4326.7	7.3	Ch
	4286.7	6.8	Ch	4345.2	8.2	Pt
	4302.7	6.8	Ch	4354.2	8.6	Pt
191033 RY SAGITTARII—						
	4274.6	7.1	Bl	4345.2	6.7	Pt
	4277.9	7.1	Ch	4347.2	6.9	Pt
	4288.8	7.3	Sm	4348.2	6.8	Pt
	4296.8	7.3	Sm	4349.2	6.9	Pt
	4304.9	7.2	Ch	4350.2	6.5	Pt
	4306.5	7.4	Bl	4350.5	7.4	Kd
	4315.3	7.2	Sm	4353.2	6.3	Pt
	4315.5	7.2	Bl	4353.5	7.4	Kd
	4322.3	6.8	Pt	4354.2	6.5	Pt
	4322.8	7.1	Sm	4355.2	6.5	Pt
	4324.5	7.0	Bl	4356.2	6.5	Pt
	4324.7	7.2	Ch	4356.5	7.2	Kd
	4327.8	7.2	Sm	4359.2	6.6	Pt
	4328.3	6.9	Pt	4360.2	6.6	Pt
	4331.2	7.0	Pt	4361.2	6.5	Pt
	4334.3	7.0	Pt	4353.2	6.6	Pt
	4335.3	7.2	Pt	4376.2	7.1	Pt
	4340.2	6.8	Pt	4377.2	7.4	Pt
	4342.3	6.7	Pt	4379.2	7.1	Pt
191124 TY SAGITTARII—						
	4324.5	[12.4	Bl			
191319 S SAGITTARII—						
	4324.5	9.9	Bl	4354.2	11.5	Pt
	4345.2	11.0	Pt			
191331 SW SAGITTARII—						
	4324.5	[12.9	Bl			
191350 TZ CYGNI—						
	4345.2	10.0	Pt	4354.2	10.2	Pt
191637 U LYRAE—						
	4345.2	8.6	Pt	4354.2	8.8	Pt
192928 TY CYGNI—						
	4344.3	11.0	Br	4354.2	10.8	Pt
	4345.2	10.8	Pt	4362.2	10.7	Br
193311 RT AQUILAE—						
	4285.8	8.9	Ch	4345.2	11.6	Pt
	4324.7	10.6	Ch	4354.2	11.8	Pt
	4344.3	11.2	Br	4370.2	12.3	Br
193449 R CYGNI—						
	4298.7	[11.3	Ch	4353.3	11.4	Bi
	4317.3	13.4	Wf	4355.2	11.4	Pt
	4324.3	13.3	Wf	4358.3	11.5	Wf
	4328.3	13.3	Wf	4361.2	11.2	Wb
	4330.3	13.5	Bi	4361.3	11.6	Wf
	4337.3	12.8	Wf	4362.2	11.5	Pj
	4342.3	12.5	Bi	4365.3	11.6	Br
	4343.2	13.0	Br	4371.1	10.9	Al
	4344.3	12.4	Wf	4373.2	10.3	Sg
	4347.2	12.0	Pt	4374.3	9.8	Bi
	4348.2	12.1	Pj	4377.2	9.6	Ly
	4348.3	12.0	Wf	4379.3	10.9	Wb
	4350.2	12.0	Pj	4380.1	9.4	Ly
	4351.2	12.0	Cy	4380.2	10.9	Wb
	4351.2	11.8	Pj	4381.2	11.0	Jo
193509 RV AQUILAE—						
	4344.3	12.9	Br	4370.2	[13.1	Br
	4347.2	13.5	Pt			
193972 T AQUILAE—						
	4274.6	7.8	Bl	4300.9	8.0	Ht
	4276.8	8.0	Sm	4315.8	9.0	Sm
	4282.8	8.0	Sm	4322.7	9.5	Sm
	4282.9	7.6	Ht	4322.8	9.5	Ht
	4288.8	8.0	Sm	4324.6	9.4	Bl
	4289.9	8.0	Ht	4327.7	9.7	Sm
	4296.8	8.2	Sm	4328.8	9.8	Ht
194048 RT CYGNI—						
	4298.7	9.8	Ch	4353.3	11.9	Bi
	4322.3	11.5	Cy	4355.2	12.1	Pt
	4330.3	11.5	Bi	4373.2	10.4	Sg
	4342.3	11.9	Bi	4374.3	9.9	Bi
	4347.2	12.1	Pt	4376.1	9.9	Du
	4351.2	11.9	Cy	4381.1	9.6	Du
194348 TU CYGNI—						
	4325.2	10.7	Bi	4353.3	9.6	Bi
	4330.3	10.1	Bi	4355.2	9.5	Pt
	4342.3	9.7	Bi	4374.3	9.8	Bi
	4343.2	9.4	Br	4376.1	10.1	Du
	4374.2	9.6	Pt	4381.1	10.2	Du
194604 X AQUILAE—						
	4317.3	14.6	Wf	4343.3	14.9	Wf
	4324.3	14.6	Wf	4359.3	14.8	Wf
	4329.3	14.8	Wf			
194632 χ CYGNI—						
	4277.9	10.7	Ch	4343.2	12.5	Br
	4286.8	11.1	Ch	4346.9	12.8	Lp
	4315.6	11.5	Ch	4337.2	12.3	Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
194632 χ CYGNI—Continued.						
	4317.3	11.8	Wf	4348.2	12.0	Pj
	4321.0	11.7	Lp	4348.3	12.5	Wf
	4321.3	11.0	Pj	4355.2	12.9	Pt
	4324.3	11.9	Wf	4358.3	12.8	Wf
	4325.3	11.2	Pj	4359.9	13.1	Lp
	4331.3	12.1	Wf	4361.3	12.8	Wf
	4337.3	12.4	Wf	4381.1	13.0	Du
	4343.2	12.5	Br			
194929 RR SAGITTARII—						
	4324.6	12.0	Bl			
195142 RU SAGITTARII—						
	4274.6	12.1	Bl	4322.8	11.6	Ht
	4288.8	11.8	Sm	4322.8	10.7	Sm
	4290.9	11.9	Ht	4324.6	11.1	Bl
	4300.9	12.1	Ht	4327.8	10.5	Sm
	4300.9	11.8	Sm	4328.8	10.9	Ht
	4315.8	11.6	Sm			
195202 RR AQUILAE—						
	4347.2	9.1	Pt	4355.2	8.8	Pt
	4350.2	9.0	Br			
195308 RS AQUILAE—						
	4350.3	13.7	Br			
195553 NOVA CYGNI No. 4—						
	4322.3	12.6	Pt	4347.2	12.9	Pt
	4328.3	12.7	Pt	4349.2	12.7	Pt
	4329.2	12.4	Pt	4353.2	12.6	Pt
	4334.3	12.5	Pt	4373.2	12.5	Pt
	4340.2	12.6	Pt	4379.2	12.6	Pt
	4345.2	12.9	Pt			
195849 Z CYGNI—						
	4318.3	11.2	Wf	4345.3	12.8	Wf
	4324.3	11.8	Wf	4347.2	11.9	Pt
	4327.7	11.2	Ch	4355.2	12.5	Pt
	4329.3	11.6	Wf	4358.3	13.5	Wf
	4338.3	12.4	Wf	4362.3	13.6	Wf
	4344.3	13.4	Br	4362.3	13.5	Br
195855 S TELESCOPII—						
	4324.6	13.0	Bl			
200212 SY AQUILAE—						
	4336.3	12.8	Br	4347.2	12.5	Pt
	4344.3	13.0	Br	4355.2	13.0	Pt
200357 S CYGNI—						
	4317.3	14.6	Wf	4344.3	13.0	Wf
	4320.3	14.6	Wf	4348.3	13.2	Wf
	4324.3	14.4	Wf	4351.2	13.7	Br
	4328.3	14.0	Wf	4353.3	13.0	Bi
	4334.2	13.8	Lv	4358.3	13.0	Wf
	4334.2	14.0	Bi	4361.3	13.0	Wf
	4336.4	14.0	Br	4374.3	12.6	Bi
	4337.3	13.3	Wf	4378.2	12.5	Sg
	4342.3	13.4	Bi			
200514 R CAPRICORNI—						
	4330.3	12.0	Bi	4378.2	12.8	Bi
	4353.3	12.7	Bi			
200715a S AQUILAE—						
	4314.0	10.6	Lp	4344.9	9.5	Lp
	4317.3	10.7	Wf	4346.9	9.5	Lp
	4318.0	10.5	Lp	4347.2	9.1	Pt
	4320.3	10.8	Wf	4348.3	9.5	Wf
	4321.1	10.1	Lp	4350.8	9.5	Lp

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
200715a S AQUILAE—Continued.						
	4324.3	10.0	Wf	4355.2	9.3	Pt
	4328.3	9.6	Wf	4357.8	9.3	Lp
	4334.1	9.3	B	4358.3	9.4	Wf
	4337.3	9.5	Wf	4359.8	9.4	Lp
	4340.	9.5	Lp	4360.2	9.4	Wf
	4343.0	9.5	Lp	4362.8	9.4	Lp
	4344.3	9.4	Wf	4365.8	9.4	L
200715b RW AQUILAE—						
	4334.1	9.3	B	4355.2	9.3	Pt
	4347.2	9.3	Pt			
200747 R TELESCOPII—						
	4274.6	11.1	Bl	4324.6	12.9	Bl
200812 RU AQUILAE—						
	4320.3	9.1	Bi	4344.3	9.9	Br
	4324.2	9.6	B	4353.3	10.2	Bi
	4330.4	9.7	Bi	4378.2	11.6	Bi
	4342.4	9.8	Bi			
200822 W CAPRICORNI—						
	4324.6	12.0	Bl			
200906 Z AQUILAE—						
	4347.2	10.1	Pt	4361.2	11.6	Br
	4355.2	10.5	Pt			
200916 R SAGITTAE—						
	4334.1	9.4	B			
200938 RS CYGNI—						
	4277.9	7.3	Ch	4347.1	7.1	Cu
	4284.7	7.8	Ch	4347.2	7.2	Pt
	4286.8	7.8	Ch	4348.1	7.3	Jo
	4298.7	7.3	Ch	4351.1	7.5	Du
	4306.9	6.9	L	4351.2	7.2	Ly
	4312.7	7.0	Ch	4351.2	7.6	Cy
	4315.6	7.0	Ch	4352.1	7.4	Hb
	4322.2	7.2	Ly	4355.1	6.9	L
	4322.2	7.1	Cy	4355.2	7.3	Pt
	4323.2	7.2	Al	4355.2	7.5	Ly
	4325.2	7.8	Sg	4356.2	7.5	Cy
	4327.7	7.2	Ch	4358.1	8.8	Jo
	4329.1	7.0	Jo	4359.2	7.7	Cy
	4329.2	7.2	Cy	4362.3	8.2	Sg
	4330.1	7.4	Ly	4364.1	7.8	Cy
	4333.1	7.0	Jo	4366.1	7.8	Cy
	4333.1	7.4	Hb	4370.1	8.0	Ly
	4333.2	7.3	Du	4371.1	7.3	Al
	4333.2	7.4	Cy	4373.2	8.3	Ly
	4341.1	7.3	Jo	4375.2	8.9	Jo
	4341.2	7.4	Cy	4376.1	8.0	Du
	4324.2	7.2	Ly	4377.2	8.3	Ly
	4345.2	7.2	Sg	4378.2	8.2	Sg
	4345.2	7.4	Cy	4380.3	8.7	Jo
	4345.2	7.3	Hy	4381.1	7.3	Al
	4346.2	7.4	Ly	4381.1	7.9	Du
201008 R DELPHINI—						
	4322.3	12.0	Cy	4347.2	10.0	Pt
	4344.3	10.5	Br	4355.2	9.5	Pt
201121 RT CAPRICORNI—						
	4347.2	7.0	Pt	4355.2	6.9	Pt
	4351.6	7.5	Kd	4356.7	7.6	Kd

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
201130 SX CYGNI—						
	4322.3	12.7	Cy	4355.2	9.8	Pt
	4337.3	9.9	Br	4356.2	9.6	Cy
	4347.2	9.8	Pt			
201139 RT SAGITTARII—						
	4274.6	11.5	Bl	4324.6	9.6	Bl
211437b WX CYGNI—						
	4315.6	[10.2	Ch	4347.1	11.9	Cu
	4322.3	11.9	Cy	4347.2	10.8	Pt
	4323.2	11.3	Bi	4351.2	11.5	Cy
	4324.2	12.0	Cy	4353.3	10.3	Bi
	4325.2	[11.7	Sg	4355.2	11.2	Pt
	4330.4	10.9	Bi	4356.2	11.4	Cy
	4333.3	11.8	Cy	4360.2	11.4	Cy
	4334.1	10.8	B	4362.3	11.8	Sg
	4341.3	11.6	Cy	4364.1	11.4	Cy
	4342.1	11.9	Ks	4374.3	9.8	Bi
	4342.4	10.0	Bi	4376.1	11.1	Du
	4345.2	11.5	Sg	4378.2	11.0	Sg
	4345.2	11.4	Cy	4381.1	11.0	Du
	4345.2	11.5	Hy	4381.1	11.2	Al
201647 U CYGNI—						
	4322.	10.0	Ro	4348.1	10.2	Jo
	4323.3	9.0	Al	4348.2	10.0	Pj
	4324.3	8.2	Bi	4349.	9.0	Ro
	4329.1	9.5	Jo	4351.2	9.5	Pj
	4333.1	9.2	Jo	4353.3	8.6	Bi
	4336.4	9.1	Bi	4355.2	8.7	Pt
	4341.1	9.2	Jo	4371.1	9.6	Al
	4343.	9.6	Ro	4378.3	8.0	Sg
	4344.2	9.4	Bi	4381.1	8.2	Al
	4345.2	9.0	Sg	4386.2	9.5	Cm
	4347.2	8.7	Pt			
202240 U MICROSCOPII—						
	4324.6	[13.0	Bl			
202817 Z DELPHINI—						
	4320.3	11.1	Bi	4347.2	9.4	Pt
	4330.4	10.7	Bi	4353.4	9.0	Bi
	4336.4	10.3	Bi	4355.2	9.0	Pt
	4344.2	9.8	Bi	4378.2	8.3	Bi
	4344.3	9.9	Br			
202946 SZ CYGNI—						
	4321.1	9.5	Pt	4354.2	9.8	Pt
	4322.3	9.6	Pt	4355.2	9.6	Pt
	4323.3	9.5	Pt	4356.2	9.5	Pt
	4328.3	9.4	Pt	4358.2	8.9	Pt
	4329.2	8.9	Pt	4359.2	8.9	Pt
	4331.2	8.8	Pt	4360.2	8.8	Pt
	4333.2	9.3	Pt	4361.2	9.3	Pt
	4335.3	9.5	Pt	4366.2	9.8	Pt
	4337.2	9.4	Pt	4367.2	9.6	Pt
	4338.2	9.6	Pt	4368.2	9.8	Pt
	4340.2	9.2	Pt	4369.2	9.7	Pt
	4342.3	9.3	Pt	4371.2	10.0	Pt
	4343.3	8.9	Pt	4372.2	9.8	Pt
	4344.2	8.9	Pt	4373.2	9.4	Pt
	4345.2	9.0	Pt	4376.2	9.0	Pt
	4347.2	9.5	Pt	4377.2	9.5	Pt
	4348.2	9.4	Pt	4377.2	9.5	Pt
	4349.2	9.1	Pt	4379.2	9.5	Pt
202946 SZ CYGNI—Continued.						
	4350.2	10.0	Pt	4380.2	9.5	Pt
	4353.2	9.6	Pt			
202954 ST CYGNI—						
	4336.4	12.9	Bi	4353.3	12.3	Bi
	4342.4	12.8	Bi	4355.2	12.2	Pt
	4347.2	12.5	Pt	4365.3	12.0	Br
	4348.3	12.6	Bi	4374.3	11.6	Bi
203226 V VULPECULAE—						
	4347.2	8.8	Pt	4355.2	9.1	Pt
203429 R MICROSCOPII—						
	4324.6	9.5	Bl			
203611 Y DELPHINI—						
	4344.3	13.5	Br			
203816 S DELPHINI—						
	4347.2	12.1	Pt	4355.2	12.0	Pt
203847 V CYGNI—						
	4286.8	9.7	Ch	4347.2	10.3	Pt
	4317.4	9.9	Wf	4348.3	10.2	Br
	4323.2	9.6	Bi	4348.3	10.8	Wf
	4324.3	9.9	Wf	4353.3	9.8	Bi
	4327.7	10.5	Ch	4355.2	9.8	Pt
	4328.3	10.3	Wf	4358.3	11.4	Wf
	4333.2	10.4	Du	4361.3	11.2	Wf
	4336.4	9.4	Bi	4374.3	9.9	Bi
	4337.3	10.4	Wf	4376.1	11.6	Du
	4344.3	10.8	Wf	4381.1	11.9	Du
203905 Y AQUARII—						
	4324.3	12.6	Cy	4362.3	12.5	Br
204016 T DELPHINI—						
	4318.3	14.2	Wf	4347.2	10.1	Pt
	4324.3	13.3	Wf	4351.3	9.8	Cy
	4329.3	12.5	Wf	4355.2	9.9	Pt
	4338.3	11.5	Wf	4358.3	9.7	Wf
	4344.3	10.5	Br	4362.2	9.9	Cy
	4345.3	10.5	Sg	4378.3	9.8	Sg
	4345.3	10.8	Wf			
204102 V AQUARII—						
	4347.2	9.2	Pt	4355.2	9.2	Pt
204104 W AQUARII—						
	4362.3	12.0	Br			
204318 V DELPHINI—						
	4341.3	[13.7	Br	4347.3	[14.0	Br
	4344.3	[13.7	Br	4351.3	[14.0	Br
204405 T AQUARII—						
	4325.7	6.1	Ch	4375.2	7.6	Jo
	4347.2	9.6	Pt	4377.2	7.6	Ly
	4355.2	9.1	Pt	4379.2	7.5	Jo
	4362.3	8.4	Br	4380.1	7.4	Hb
	4370.2	7.9	Ly	4380.2	7.7	Ly
	4373.2	7.6	Ly	4380.2	7.5	Jo
204846 RZ CYGNI—						
	4318.3	11.5	Wf	4347.2	11.4	Pt
	4323.3	10.6	Bi	4348.3	11.6	Br
	4324.3	11.3	Wf	4353.3	10.8	Bi
	4325.2	11.4	Sg	4355.2	11.6	Pt
	4329.3	11.4	Wf	4359.3	11.6	Wf
	4336.4	10.6	Bi	4361.3	11.3	Bi
	4338.3	11.4	Wf	4362.3	11.5	Br
	4344.2	11.4	Bi	4374.3	11.3	Bi
	4345.3	11.5	Wf			

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
204954 S INDI—						
	4274.6	10.4	Bl	4324.6	12.5	Bl
205017 X DELPHINI—						
	4320.3	12.6	Bi	4347.2	11.6	Pt
	4330.4	12.2	Bi	4353.4	10.4	Bi
	4342.4	11.5	Bi	4355.2	9.8	Pt
	4344.3	11.3	Br	4378.3	8 5	Bi
205923a R VULPECULAE—						
	4317.4	9.2	Wf	4341.3	12.2	Wf
	4318.3	9.4	Wf	4343.3	12.5	Wf
	4320.3	9.5	Wf	4344.2	12.3	Bi
	4320.3	9.5	Bi	4344 3	12.7	Wf
	4321.3	9.8	Wf	4345.2	11.8	Sg
	4323.3	10.1	Wf	4345.3	12.7	Wf
	4324.3	10.1	Wf	4346.3	13.0	Wf
	4325.3	10.3	Wf	4347.2	12 3	Pt
	4326.3	10.6	Wf	4347.3	12.7	Br
	4327.3	10.7	Wf	4348.4	13.0	Wf
	4328.3	10.9	Wf	4349.3	13.1	Wf
	4329.3	10.8	Wf	4350 3	13.1	Wf
	4330.3	11.0	Wf	4352.3	13.0	Wf
	4330.4	10.3	Bi	4353.4	13.0	Bi
	4331.3	11.4	Wf	4355.2	13.4	Pt
	4334.4	11.5	Wf	4358.3	12.9	Wf
	4335.3	11.4	Wf	4359.3	13.0	Wf
	4336.3	11.6	Wf	4373.2	11.2	Sg
	4336.3	12.0	Br	4374.4	10.7	Bi
	4337.3	11.6	Wf			
205923b — VULPECULAE—						
	4345.2	9.4	Sg	4373.2	9.6	Sg
210129 TW CYGNI—						
	4343.3	13.7	Br			
210382 X CEPHEI—						
	4336.3	[13.2	Br	4350.3	[14.0	Br
210504 RS AQUARII—						
	4347.2	10.3	Pt	4362.3	10.2	Br
	4355.2	9.8	Pt			
210516 Z CAPRICORNI—						
	4355.2	10.8	Pt			
210812 R EQUULEI—						
	4318.3	14.3	Wf	4344.2	[13.8	Br
	4324 3	14.4	Wf	4351.3	[13.8	Br
	4329.3	14.4	Wf	4358.3	14.2	Wf
	4343.3	14.4	Wf			
210868 T CEPHEI—						
	4285.8	6.6	Ch	4354.2	6.0	Wb
	4304.9	6.4	Ch	4355.1	5.8	L
	4322.2	6.4	Du	4355.2	6.1	Pt
	4323.2	6.3	Du	4358.1	5.8	Jo
	4325.7	6.1	Ch	4361.1	6.1	Du
	4326.1	6.2	Du	4361.2	5.9	Cy
	4328.3	6.2	Pt	4362.1	6.0	Du
	4329.1	6.4	Jo	4363.1	6.1	Du
	4329.3	6.2	Du	4363 2	5.5	Jo
	4333.2	6.3	Jo	4372.1	6.4	Du
	4333.2	6.2	Du	4374.1	6.0	Jo
	4338.1	6.0	Du	4375.2	6.3	Du
	4343.2	6.0	Jo	4376.1	6.3	Du
	4344 1	5.8	Du	4379.1	6.5	Du
	4346.3	6.4	Sg	4379.1	6.3	Jo
	4347.2	5.8	Du	4379.2	6.6	Cm
210868 T CEPHEI—Continued.						
	4348.2	5.8	Jo	4380.0	6.6	Du
	4350.1	5.9	Du	4380.1	6.0	Hb
	4351.1	5.6	Jo	4380.1	6.6	Cm
	4351.1	5.8	Du	4381.1	6.5	Du
	4352.1	5.8	Du	4382.0	6.5	Du
	4353.1	6.0	Jo	4386.1	6.7	Cm
	4353.6	5.6	Mm			
210903 RR AQUARII—						
	4328.3	13.1	Pt	4355 2	12.0	Pt
211614 X PEGASI—						
	4317.4	11.4	Wf	4346.9	9.9	Lp
	4320.3	11.0	Wf	4348.4	9.9	Wf
	4324.3	10.9	Wf	4350.8	9.9	Lp
	4328.3	11.1	Pt	4355.2	9.0	Pt
	4328 7	10.7	Wf	4358.3	9.4	Wf
	4337.3	9.9	Wf	4358.8	9.9	Lp
	4344.3	9.9	Wf	4360.2	9.5	Wf
	4344.4	10.0	Br	4362.8	9.8	Lp
	4344.9	9.9	Lp			
212030 S MICROSCOPII—						
	4315.9	[12.4	Sm	4322.9	[12.4	Sm
213244 W CYGNI—						
	4301.6	6.0	Kd	4348.5	6.1	Kd
	4314.5	6.0	Kd	4349.5	6.1	Kd
	4318.5	6.0	Kd	4350.5	6.1	Kd
	4328.7	6.0	Kd	4352.5	6.1	Kd
	4347.5	6.0	Kd	4356.5	6.0	Kd
213678 S CEPHEI—						
	4313.9	8.5	Lp	4344 3	7.8	Bi
	4318.0	8.5	Lp	4346.9	9.0	Lp
	4320.4	7.2	Bi	4347.1	8.8	Cu
	4323.2	8.5	Du	4350.9	8.7	Lp
	4323.3	7.5	Bi	4351.1	8.7	Du
	4326 1	8.5	Du	4355.2	7.5	Pt
	4328.3	7.8	Pt	4359.9	8.8	Lp
	4333.1	8.6	Du	4361.2	8.4	Cy
	4333.1	8.7	Cu	4376.2	8.8	Du
	4336.1	7.2	Cu	4378.4	7.8	Bi
	4336.3	9.5	Br	4381 2	9.1	Du
	4344.1	8.6	Du			
213753 RU CYGNI—						
	4327.7	8.5	Ch	4355.2	8.3	Pt
	4328.3	8.4	Pt			
213843 SS CYGNI—						
	4290.9	11.2	Kl	4344.2	8.5	Pt
	4298.9	11.0	Ch	4344.2	8.9	Bi
	4301.7	7.9	Ch	4344.3	8.7	Wf
	4302.7	9.9	Ch	4345.2	9.1	Pt
	4303.7	8.4	Ch	4345.2	8.4	Cy
	4304.9	8.3	Ch	4345.2	8.5	Hy
	4305.9	8.3	Ch	4345.3	8.6	Wf
	4306.9	8.5	L	4345.9	8.7	Kl
	4310.9	10.1	L	4346.2	8.5	Ly
	4313.9	10.3	L	4346.3	9.5	Sg
	4317.4	11.4	Wf	4346.3	8.9	Wf
	4318.3	11.4	Wf	4347.1	8.9	Cm
	4320 3	11.8	Bi	4347.2	8.9	Ly
	4320.3	11.9	Wf	4347.2	9.0	Sg
	4321.1	11.7	Pt	4347.2	9.0	Br
	4321.3	11.4	Wf	4347.2	9.5	Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
213843 SS CYGNI—Continued.						
	4322.	11.4	Ro	4347.9	9.3	Kl
	4322.2	11.7	Cy	4348.2	9.7	Pt
	4322.2	11.5	Ly	4348.2	9.3	Br
	4322.3	11.6	Wf	4348.4	9.1	Wf
	4322.3	11.7	Pt	4349.	9.7	Ro
	4323.3	11.6	Bi	4349.1	10.2	Ya
	4323.3	11.0	Wf	4349.2	10.2	Pt
	4323.3	11.0	Al	4349.3	9.6	Wf
	4323.3	11.6	Pt	4350.2	10.0	Br
	4323.5	[9.6	Ls	4350.2	10.3	Pt
	4324.2	11.6	B	4350.3	10.1	Wf
	4324.3	11.5	Cy	4351.1	10.5	Du
	4324.3	11.5	Wf	4351.2	10.9	Ly
	4324.7	11.5	Ch	4351.2	10.3	Br
	4325.2	11.5	B	4351.2	11.0	Cy
	4325.2	11.5	Sg	4351.9	10.4	Kl
	4325.2	11.2	Ya	4352.1	11.0	Du
	4325.3	11.5	Wf	4352.3	11.2	Wf
	4325.7	11.5	Ch	4353.2	10.9	Br
	4326.1	11.3	Ie	4353.2	10.9	Pt
	4326.2	11.5	Cy	4353.4	11.4	Bi
	4326.4	11.4	Wf	4354 2	11.6	Pt
	4326.7	11.5	Ch	4355.1	11.2	L
	4326.9	11.0	L	4355.2	11.7	Pt
	4327.3	11.3	Wf	4355.2	11.0	Cy
	4327.3	11.0	Sg	4355.2	11.0	Ly
	4327.6	[10.0	Ls	4356.2	11.3	Br
	4327.7	11.6	Ch	4356.2	11.7	Pt
	4328.3	11.5	Wf	4356.2	11.0	Cy
	4328.3	11.6	Pt	4358.2	11.6	Br
	4329.2	11.5	Cy	4358.2	11.8	Pt
	4329.2	11.6	Br	4358.3	11.3	Wf
	4329.2	11.6	Pt	4359.1	11.1	Cy
	4329.3	11.4	Wf	4359.2	11.8	Pt
	4329.6	[10.0	Ls	4359.3	11.6	Wf
	4330.2	11.6	Ly	4360.1	11.6	Cy
	4330.3	11.5	Wf	4360.2	11.8	Pt
	4330.4	11.6	Bi	4360.3	11.7	Wf
	4331.2	11.7	Pt	4361.2	11.5	Br
	4331.3	11.4	Wf	4361.2	11.8	Pt
	4332.3	11.7	Bi	4361.2	11.4	Cy
	4332.3	11.4	Wf	4361.3	11.4	Wf
	4333.1	11.4	Ie	4361.3	11.6	Bi
	4333.2	11.5	Pt	4361.3	11.0	Sg
	4333.2	11.1	Sg	4362.1	11.3	Cy
	4333.3	11.2	Cy	4362.2	11.6	Br
	4334.1	11.4	B	4362.3	11.6	Wf
	4334.3	11.7	Br	4363 2	11.5	Br
	4334.4	11.6	Wf	4364.5	11.6	Cy
	4334.4	11.7	Bi	4365.1	11.8	Cy
	4335.2	11.5	Cy	4365.2	12.0	Br
	4335.3	11.6	Pt	4365.2	11.7	Pt
	4335.3	11.6	Wf	4366.1	11.8	Cy
	4336.3	11.0	Br	4366.2	[10.9	Pt
	4336.3	11.2	Wf	4367.2	[10.0	Pt
	4336.4	11.0	Bi	4367 2	11.9	Br
	4337.2	10.8	Br	4368.2	[10.0	Pt
	4337.2	[9.6	Pt	4368.2	11.2	Br
	4337.3	10.8	Wf	4369.2	11.7	Pt
	4338.2	10.8	Pt	4370.2	11.6	Br
213843 SS CYGNI—Continued.						
	4338.3	10.9	Wf	4371.2	11.7	Br
	4340.2	9.5	Pt	4371.2	11.7	Pt
	4341.1	9.8	Cm	4372.2	11.7	Pt
	4341.2	9.5	Cy	4373.2	11.2	Pt
	4341.2	9.4	Br	4373.2	11.5	Ly
	4341.2	9.3	Wf	4373.2	10.7	Sg
	4342.1	9.1	Ks	4374.3	11.7	Bi
	4342.2	8.5	Ly	4375.1	11.5	Du
	4342.3	9.0	Pt	4376.1	11.4	Du
	4342.4	9.5	Bi	4376.1	11.0	Ks
	4342.6	9.3	Ls	4376.2	11.0	Pt
	4343.	8.7	Ro	4377.2	11.5	Ly
	4343.1	8.8	B	4377.2	11.5	Pt
	4343.1	8.8	Ya	4378.2	11.8	Sg
	4343.2	9.0	Br	4378.3	11.8	Bi
	4343.2	8.4	Ly	4379.0	11.4	Du
	4343.3	8.8	Wf	4379.1	11.3	Ly
	4343.3	8.9	Pt	4379.2	11.7	Pt
	4344.1	8.4	Cm	4380.0	11.5	Du
	4344.2	8.8	Br	4380.1	11.5	Ly
	4344.2	8.4	Ly	4380.2	11.7	Pt
	4344.2	8.3	Cy	4381.0	11.5	Du
	4344.2	**9.0**	**Sg**	**4381.1**	11.5	.
213937 RV CYGNI—						
	4328.3	6.7	Pt	4356.2	6.5	Pt
214024 RR PEGASI—						
	4318.3	14.0	Wf	4343.3	14.4	Wf
	4324.3	14.3	Wf	4356.2	13.8	Pt
	4328.3	13.7	Pt	4358.4	13.8	Wf
	4329.3	14.1	Wf			
214247 R GRUIS—						
	4300.9	12.6	Ht	4322.9	11.6	Ht
	4315.9	12.0	Sm	4327.8	11.4	Sm
	4322.8	11.6	Sm	4328.8	10.7	Ht
215605 V PEGASI—						
	4320.3	10.7	Bi	4353.4	12.4	Bi
	4328.3	11.3	Pt	4356.2	12.5	Pt
	4342.4	12 0	Bi	4374.4	12.6	Bi
	4344.4	12.4	Br			
215717 U AQUARII—						
	4328.3	11.7	Pt	4356.2	12.0	Pt
215934 RT PEGASI—						
	4320.3	13.6	Bi	4351.3	13.0	Br
	4328.3	11.3	Pt	4353.4	14.0	Bi
	4344.3	13.8	Bi	4378 3	[13.9	Bi
	4345.3	12.0	Sg			
220133b RZ PEGASI—						
	4328.3	9.9	Pt	4356.2	10.3	Pt
220412 T PEGASI—						
	4351.4	11.8	Br			
220613 Y PEGASI—						
	4344.2	[13.4	Bi	4361.3	13.9	Bi
	4351.4	[13.9	Bi	4378.3	12.9	Bi
220714 RS PEGASI—						
	4328.3	13.3	Bi	4351.4	[13.9	Br
	4344.3	13.6	Bi			
221938 T GRUIS—						
	4322.9	8.8	Sm	4330.9	8.7	Sm

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1925—Cont.

Star	J.C.D.	Est.	Obs.	J.C.D.	Est.	Obs.
221948 S GRUIS—						
	4290.9	[12.2	Ht	4322.9	[12.2	Ht
	4300.9	[12.2	Ht	4331.9	[12.2	Ht
	4315.9	[12.2	Sm			
222129 RV PEGASI—						
	4336.4	[12.5	Br	4351.3	[12.5	Br
222439 S LACERTAE—						
	4320.3	11.7	Bi	4356.2	9.9	Pt
	4328.3	11.9	Pt	4366.4	9.1	Bi
	4344.3	10.4	Bi	4378.3	8.5	Bi
	4351.3	10.3	Br			
222867 R INDI—						
	4274.6	9.6	Bl			
223462 T TUCANAE—						
	4290.9	[12.3	Ht	4322.9	[12.3	Ht
	4300.9	[12.3	Ht	4331.9	11.8	Ht
	4322.8	[12.3	Sm			
223841 R LACERTAE—						
	4320.4	14.0	Bi	4366.4	13.2	Bi
	4344.3	13.5	Bi	4378.3	12.5	Bi
	4351.3	13.8	Br			
225914 RW PEGASI—						
	4351.4	[13.4	Br			
230110 R PEGASI—						
	4326.4	8.5	Wf	4348.4	9.6	Wf
	4328.3	8.6	Wf	4351.4	9.0	Br
	4328.3	8.5	Pt	4351.9	9.3	Kl
	4330.3	8.6	Wf	4356.2	9.8	Pt
	4337.3	8.7	Wf	4358.4	9.8	Wf
	4344.3	9.0	Wf	4361.3	9.7	Wf
230759 V CASSIOPEIAE—						
	4275.1	11.5	Du	4351.4	11.5	Br
	4302.9	[10.5	Ch	4354.3	11.9	Cy
	4322.3	11.4	Cy	4356.2	11.2	Pt
	4328.3	11.6	Pt	4361.2	11.4	Cy
	4341.3	11.9	Cy	4365.3	11.5	Br
	4343.	12.0	Ro	4381.2	11.5	Du
	4350.6	12.0	Mm			
231425 W PEGASI—						
	4320.4	11.2	Bi	4366.4	9.5	Bi
	4344.3	10.6	Bi	4378.3	9.5	Bi
	4351.9	11.2	Kl			
231508 S PEGASI—						
	4328.3	12.0	Pt	4356.2	12.6	Pt
	4351.4	12.3	Br			
231878 RY CEPHEI—						
	4304.8	[9.5	Ch			
232746 V PHOENICIS—						
	4331.9	10.8	Ht			
232848 Z ANDROMEDAE—						
	4328.3	9.5	Pt	4347.1	9.4	Cu
	4333.2	9.0	Cu	4356.2	9.4	Pt
233335 ST ANDROMEDAE—						
	4302.9	10.6	Ch	4356.2	9.8	Pt
	4328.3	9.8	Pt			
233815 R AQUARII—						
	4298.9	8.0	Ch	4356.2	9.5	Pt
	4328.3	9.2	Pt			
233956 Z CASSIOPEIAE—						
	4318.3	14.2	Wf	4351.4	[13.4	Br
	4324.3	14.2	Wf	4358.4	14.1	Wf
	4329.3	14.4	Wf	4361.2	[13.1	Cy
	4343.3	14.4	Wf	4378.3	14.0	Bi
	4344.3	[13.8	Bi			
235053 RR CASSIOPEIAE—						
	4351.4	11.2	Br	4381.2	12.5	Du
	4375.1	12.3	Du			
235265 R TUCANAE—						
	4329.9	9.8	Sm	4330.9	10.8	Sm
235350 R CASSIOPEIAE—						
	4320.4	7.7	Bi	4347.2	8.6	Du
	4326.2	8.1	Du	4351.1	9.0	Du
	4333.2	8.2	Du	4351.4	8.5	Br
	4341.3	8.9	Cy	4354.3	9.2	Cy
	4344.2	9.0	Du	4375.1	9.2	Du
	4344.3	8.0	Bi			
235525 Z PEGASI—						
	4328.3	12.6	Pt	4356.2	12.1	Pt
	4351.4	11.8	Br			
235855 Y CASSIOPEIAE—						
	4351.4	10.0	Br	4381.2	10.8	Du
	4376.2	10.7	Du			
235939 SV ANDROMEDAE—						
	4328.3	13.2	Pt	4356.2	13.6	Pt
	4351.4	13.2	Br	4378.3	13.6	Bi

Total observations, 3333; stars observed 353; total observers, 35.

vitation to hold similar meetings there annually, if they so desired. Miss Farnsworth and Professor Van Biesbroeck excelled themselves in carrying out their well laid plans for the meeting and entertainment of members. The Recording Secretary was able to attend the meeting and he feels that from now on the heretofore isolated members of the mid-west will take a greater part in the work of the Association. Mr. Campbell gave a rather detailed talk on variable stars, with special attention to the irregulars and the long periods, as well as describing some of the outfits and equipments of numerous members. The talk was well illustrated with slides from the AAVSO Slide Collection. The meeting was voted a huge success, and similar meetings might well be held in other sections of the country with material advantage to the Association and its individual members.

Until further notice, members need not feel required to send in duplicate lists

of observations, at least while the preparation of these reports is being carried on at the Harvard Observatory. Also, members are requested to continue reporting their observations, for the balance of the year at least, in the new astronomical time unit, Julian Civil Date. The matter for next year will be completely considered at the coming meeting of the Association to be held at Cambridge on October 17.

The following observers have contributed to this double report: Allen, "Al"; Bouton, "B"; Berman, "Bi"; Baldwin, "Bl"; Brocchi, "Br"; Chandra, "Ch"; Chisolm, "Cm"; Cilley, "Cy"; Cunningham, "Cu"; Dunham, "Du"; Gaebler, "Gb"; Henry, "Hy"; Houghton, "Ht"; Iedema, "Ie"; Jones, "Jo"; Kanda, "Kd"; Kleis, "Ks"; Kohl, "Kl"; Lacchini, "L"; Mrs. Leavens, "Ls"; Leavenworth, "Lv"; Lepper, "Lp"; Mrs. Lytle, "Ly"; Marshall, "Mh"; Millman, "Mm"; Peltier, "Pt"; Petrie, "Pj"; Rhorer, "Ro"; Skaggs, "Sg"; Smith, "Sm"; Suter, "Su"; Waterfield, "Wf"; White, "Wb"; and Yalden, "Ya".

LEON CAMPBELL, Recording Secretary.

September 10, 1925.

COMET NOTES.

Elements of Comet *c* 1924 (Finsler). — On page 71 of the No. 849 *Astronomical Journal* are ten observed positions of Finsler's Comet by Dr. Ernest Clare Bower of the U. S. Naval Observatory. From these ten positions I have secured normals, and from these, orbit elements. The elements come out hyperbolic. The log x' at the bottom of page 253 *Watson's Theoretical Astronomy* comes out negative ($x' = -0.0000145$). The $e = 1.0005304$. These elements were computed with great care and they satisfy the ten observed positions. The x' I mention is from the formula

$$x' = m'/s'^2 - j'.$$

ELEMENTS OF FINSLER'S COMET.

T =	1924 Sept. 4.85978 G. Civil T.
ω =	66° 32′ 32″.11
i =	120 8 18.40
☊ =	80 2 57.05
Log e =	0.0002303
Log q =	9.6085186

FRANK E. SEAGRAVE.

Boston, Mass., July 28, 1925.

Brooks' Periodic Comet (1889V) is reported to have been rediscovered by Tscherny at Kiew on Sept. 19. The position given in the discovery cablegram from Copenhagen is

G. C. T.	α	δ
Sept. 19.7983	$23^h\ 17^m\ 36^s.9$	−5° 12′ 35″.

The magnitude is given as 9. This is somewhat surprising since the comet at recent returns has been very faint.

The comet was searched for in vain within reasonable distance of the above position, with our 5-inch and 16-inch telescopes on the night of Sept. 22, although faint nebulae were seen in the vicinity.

If the above observation is correct the following ephemeris by A. Dubiago,

given in *Astronomische Nachrichten* 5332, should be corrected by adding approximately 19^m to α and substracting 14′ from δ.

EPHEMERIS OF BROOKS' PERIODIC COMET.

0^h G.C.T.	α 1925.0 h m s	δ 1925.0 ° ′	log r	log Δ
Oct. 8	22 55 44	—7 05.0	0.278	9.987
12	22 56 11	—7 24.6		
16	22 57 07	—7 40.5	0.276	0.003
20	22 58 32	—7 52.1		
24	23 00 28	—7 59.5	0.274	0.023
28	23 02 53	—8 02.6		
Nov. 1	23 05 47	—8 01.5	0.273	0.045
5	23 09 09	—7 56.3		
9	23 12 57	—7 47.2	0.273	0.069
13	23 17 10	—7 34.2		
17	23 21 46	—7 17.6	0.273	0.094

A photograph taken with our 6-inch camera with an exposure of one hour on Sept. 24 shows no nebulous object of ninth magnitude within 5° of the observed position.

A later cablegram from Copenhagen gives the following position obtained by Albatsky and Shainzpt (place not designated):

G. C. T.	α	δ	
Sept. 24.7902	23^h 18^m 06^s.7	—4° 02′ 54″	Magnitude 12.

Borrelly's Periodic Comet (*f* 1925) was rediscovered by A. Schaumasse at Nice on Aug. 14, 1925. Its position was

	G. C. T.	α	δ
1925 Aug. 14	3^h 18^m.2	5^h 04^m 24^s	+2° 04′.

This is about 2^m east and 26′ north of the predicted place as given on p. 483 of the August-September number of POPULAR ASTRONOMY and indicates that the date of perihelion should be about Oct. 7.8. The magnitude assigned to the comet on Aug. 14 was 13 and, as its position relative to the earth will not improve very much, the comet is not likely to be much brighter at this apparition.

The following ephemeris by J. P. Möller is given in Copenhagen Circular No. 77.

EPHEMERIS OF BORRELLY'S COMET (*f* 1925).

0^h G.C.T.	α 1925.0 h m	δ 1925.0 ° ′
Oct. 1	7 24.4	+14 42
9	7 49.0	+17 05
17	8 13.8	+19 34
25	8 38.9	+22 10
Nov. 2	9 03.9	+24 51
10	9 28.6	+27 41
18	9 52.8	+30 36
26	10 16.1	+33 37
Dec. 4	10 38.1	+36 45
12	10 58.3	+39 56
20	11 16.3	+43 10
28	11 31.3	+46 25

Wolf's Periodic Comet (*e* 1925) was detected by Dr. W. Baade at Bergedorf, on a photograph taken on the night of July 13-14. The magnitude was estimated as 15. The comet was quite close to the predicted position.

COMMUNICATIONS.

A Bright Meteor.—On Friday, Aug. 8, 1925, 2:45 A. M., Central Time, my attention was attracted by a brilliant yellow meteor, passing in front of telescope. There was a distinct wisp of light behind it, though blurred in spots. In size to naked eye it appeared near that of planet Jupiter in a 19 ligne telescope.

This meteor was traveling S.W.W. and I presume it came from the Perseids, which I think are due this time of year.

GEO. W. PROCTOR.

914 Tuscaloosa Ave., Birmingham, Ala., Aug. 13, 1925.

The Perseids Aug. 11.—The Perseids were very numerous this year, especially on the date of August 11. The writer has always been interested in knowing how many meteors could be counted at the maximum of a large shower, when enough observers were available to cover the entire sky.

On August 11, I secured the assistance of three keen-sighted young fellows. Each one of them was assigned a quadrant and they were warned against duplication. As further guard against this I asked that they call out the color and whether faint, fairly bright, or bright. As they were inexperienced in estimating magnitudes I did not keep these data.

Following are the results for all four quadrants:

Began:	11:26 P. M. C. S. T.
Ended:	12:50 A. M. "
Condition of sky clear.	
Total number meteors seen:	227
Hourly rate:	162
Rate per minute:	2.7 plus.

Two large meteorites of about 0.0 magnitude each were observed by the writer. The first of these was seen directly overhead and its course was southwest down the center of the Milky Way. When it first appeared it was green, but, on bursting just before disappearance, it became orange and finally red. A trail of 0.5 minutes duration was observed. The latter fireball appeared in the east and passed swiftly through Aries going due south. It was green and left a trail visible for a half minute in spite of the slight graying of the sky in that direction due to the rising moon.

I would be glad to hear from anyone who observed this shower.

STERLING BUNCH.

Springtown, Texas, August 14, 1925.

GENERAL NOTES

Witold Ceraski, emeritus professor of the University and former director of the Observatory of Moscow, Russia, died on May 29, 1925, at the age of 76 years. He was director of the Observatory from 1890 to 1916. He was much interested in celestial photography and his wife, Mme. L. Ceraski, discovered many variable stars on the plates taken at Moscow.

Mr. Clarendon Ions, formerly of Fort Worth, Texas, has moved to Miami, Florida, where he has taken the several telescopes which he has built. He is interested in work with high school children, Boy Scout organizations, and

the teaching of the practical uses of astronomy and construction of telescopes. His address is: Vanderpool Building, Miami, Fla.

Mr. Ions has besides his home-made instruments a fine nine-inch Cassegrainian reflector, one of the last mirrors made by the late Dr. Brashear of Pittsburgh, and acquired from Dr. David E. Hadden, of Alta, Iowa.

Director Heber D. Curtis of the Allegheny Observatory sails from San Francisco on September 26 to observe the total solar eclipse of January 14 next. He will be associated with Dr. J. A. Miller and the Swarthmore Eclipse Expedition; the camp will probably be located at Benkoelen, Sumatra. He will be accompanied by Mrs. Curtis and by his youngest son, Baldwin. After the eclipse, they will continue their journey around the world and arrive in Pittsburgh again about March 12.

The Swarthmore College Eclipse Expedition to Sumatra.—Swarthmore College is sending out an expedition from the Sproul Observatory to make observations on the sun during the total solar eclipse which occurs on January 14, 1926. The expedition will go to the Dutch East Indies, where it plans to erect instruments on the west coast of Sumatra in the vicinity of Benkoelen. The instruments and equipment to be used by the expedition were shipped from New York on the Dollar Steamship Liner *President Garfield* via the Panama Canal and the Orient on September 3, 1925. The instruments will reach Singapore on November 3, 1925; they will then be re-shipped by boat to Palembang, Sumatra, and from there by railroad and motor truck to Benkoelen.

The path of totality for the 1926 eclipse sweeps over East Africa, the Indian Ocean, Sumatra, Borneo, and the Philippines. Totality occurs in the vicinity of Benkoelen at about 2:25 o'clock P. M. Local Mean Time. The duration of the central eclipse is $2^m\ 21^s$ on the west coast of Sumatra; whereas totality lasts $3^m\ 10^s$ at Benkoelen. There the altitude of the sun during totality is approximately 52½ degrees and the diameter of the shadow cone is about 90 miles.

The personnel of the expedition consists of Professor John A. Miller (Director of the expedition) and Mrs. Miller; Dr. H. D. Curtis (Director of Allegheny Observatory), Mrs. Curtis and their 12 year old son; Ross W. Marriott and Dean B. McLaughlin, both of Sproul Observatory, Swarthmore College; Adrian Rubel and Wilson M. Powell, both Seniors at Harvard; and Lamont Dominick of New York. Six of the members of the expedition were also members of the Sproul Observatory Expeditions to Mexico in 1923 and to New Haven in 1925. Professor and Mrs. Miller sailed from San Francisco in early July. They plan to travel for a few months in China and Japan before going to Singapore to take charge of the instruments when they arrive there on November 3. The other members of the observing party will leave at different times during September and October, some taking the eastward route, and some the westward. It is expected that all members will reach Sumatra in time to get the erection of the instruments under way by December 1.

As part of its program the expedition plans to make photographs of the solar corona with cameras of various focal lengths. The largest camera to be used for this purpose has a lens 62.5 feet in focal length and 9 inches in diameter. This stationary camera, which is to be constructed at the camp, will be directed toward that point in the sky where the center of the sun will be at the time of mid-totality. The lens for this camera will be mounted on a tower a little more than 50 feet high. A large tube will lead from the top of the tower to a dark

room in which the plates are to be exposed. The apparent motion of the sun in the sky will be compensated for by a clockwork mechanism which moves the plate in the focal plane of the lens at the proper rate. Ten exposures are planned for this camera on plates 18 by 22 inches. Two men will be stationed in the dark room to change plates and make exposures. The other cameras used for photographing the solar corona range in focal length from 30 inches to 6 feet. They will be mounted equatorially and be made to follow the sun by a large driving clock.

With a large twin camera it is hoped to photograph not only the solar corona but also the star-field surrounding the sun. This instrument is a structural steel camera carrying twin lenses 6¼ inches in diameter and 15 feet in focal length, mounted in a heavy structural steel polar axis whose ball bearings rest on heavy concrete piers. It weighs at least one ton. This camera will be made to follow the stars approximately by means of a large driving clock; however, the exact guiding of the instrument will be effected by slow motion screws. Additional photographs will be made with this instrument in an attempt to find out whether there is any deflection of light caused by abnormal refraction due to the cooling atmosphere in the shadow cone.

The spectrographic program will be carried on by two large Rowland Concave Gratings, one prism slit spectrograph, one objective prism spectrograph and two Etalon interferometers. The two Rowland Concave Gratings, mounted objectively, will be used to make spectrograms of the "Flash Spectrum" for the range $\lambda = 4000$ A to $\lambda = 9000$ A. The slit spectrograph will be used to photograph the Fraunhofer lines; the objective prism spectrograph to search for gas clouds in the solar corona. The two Etalon interferometers have different separation of the plates and will be employed in an attempt to detect motion in the corona.

In addition to the above outlined program the brightness of the corona will be determined by a photometer; photographs of the corona made with color photography; and a moving picture camera mounted to make pictures of the eclipse during partial and total phase.

Ross W. Marriott.

Sproul Observatory, Swarthmore, Pa., Sept. 10, 1925.

The Aurora of August 22.— Last Saturday evening, August 22, about 8:10 Central Standard Time, my attention was called to a dull glow on the northern horizon as seen from the roof of the Drake University Observatory. My assistant, Mr. Ward Wilson, called my attention to this phenomenon and suggested we might have a display of northern lights. There were several observers at the observatory and we all watched with increasing interest. In a few moments three distinct arches could be detected crossed by faint streamers darting up from the horizon. They were most intense a little to the east of north. These streamers steadily increased in brightness and seemed to separate into two parts, a small section toward the east of the north point and a larger one gradually moving toward the west. The larger section was extremely bright and streamers between 30 and 40 degrees in length shot up toward the zenith. The flickering of the streamers gave an impression of advancing toward the east.

A little later this section appeared as a sheet of light about 10 degrees wide and distinct colors could be detected, ranging from reddish yellow to yellowish green.

Shortly after the maximum brightness and activity, which was between 8:25 and 8:35, both sections quickly diminished and disappeared entirely. A faint

glow was again observed near the horizon between 9:10 and 9:15.

I had little opportunity to watch for the phenomenon the succeeding nights. I have heard some unfounded rumors that the northern lights were visible Sunday evening, but I did not see them.

D. W. Morehouse.

Drake University, Des Moines, Iowa, August 28, 1925.

Photometry and Photography of the Recent Solar Eclipse.— The July issue of the *Transactions of the Illuminating Engineering Society* features a report in which are combined the results of determinations of natural light during the solar eclipse of January 24, 1925, as reported by 13 expeditions organized throughout the band of totality in the United States and Canada. The report contains a wealth of data on this subject and is illustrated by charts and corona photographs. Among several appendices is one regarding photographic experience for the benefit of future investigators.

A few copies of this number of the Transactions are available and may be obtained at $1.00 each from the Illuminating Engineering Society, 29 West 39th Street, New York, N. Y.

Eine Fahrt durch die Sonnenwelt by F. Becker, Ferd. Dümmler, Berlin and Bonn, 131 pp., 1925. Price 3.50 marks.

A scientist can be of real service to the world at large if he can write about his science in such simple terms that the layman can understand it. In this little book on the solar system Dr. Becker has succeeded admirably in stating the elementary facts and theories. He has taken into account the essentials of recent observations. The book can be recommended to anyone who can read German.

A Graphic Table of Logarithms and Antilogarithms by Adrian Lacroix and Charles L. Ragot, published by the MacMillan Company, New York.

This new table gives in 40 pages the 5-place logarithms of all 5-place numbers without interpolation. The plan is that of a continued pair of scales like those of a slide-rule, except that the scales are fixed in position. The scale on the upper side of the lines gives the numbers while that on the under side gives the logarithms.

With a little practice one can very quickly read the logarithm corresponding to a sequence of five digits, or with equal facility read the number to five digits corresponding to a five-place mantissa.

A four-place graphic table is given on six pages following the five-place table

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Extra Pages in Popular Astronomy.— If any of our readers feel that the large table of variable star observations takes up too much space, the Editors ask them to notice that many of the issues of the magazine contain 76 pages instead of the usual 60 pages, besides the advertising matter.